



**PERIYAR  
MANIAMMAI**  
INSTITUTE OF SCIENCE & TECHNOLOGY  
(Deemed to be University)  
Established Under Sec. 3 of UGC Act, 1956 • NAAC Accredited  
think • innovate • transform

## Criterion 1 – Curricular Aspects

<b>Key Indicator</b>	1.1	Curriculum Design and Development
<b>Metric</b>	1.1.2	Percentage of Programmes where syllabus revision was carried out during the 2020-21

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Legend : **Highlighted color – Red**

– Indicates courses which are removed from syllabus before revision

**Highlighted color – Florescent yellow**

– Indicates courses which are added to syllabus after revision

## 1. Minutes of the Board of Studies held on 21.09.2020 for MCA Programmes

### DEPARTMENT OF COMPUTER SCIENCE AND APPLICATIONS

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**PERIYAR  
MANIAMMAI**  
INSTITUTE OF SCIENCE & TECHNOLOGY  
VALLAM  
WISDOM • INTEGRITY • INNOVATION

Date : 21.09.2020

Date : 21.09.2020

Time : 2.30 p.m

Venue : On Line Mode: Google Meet Link: [meet.google.com/bdr-smya-eaq](https://meet.google.com/bdr-smya-eaq)

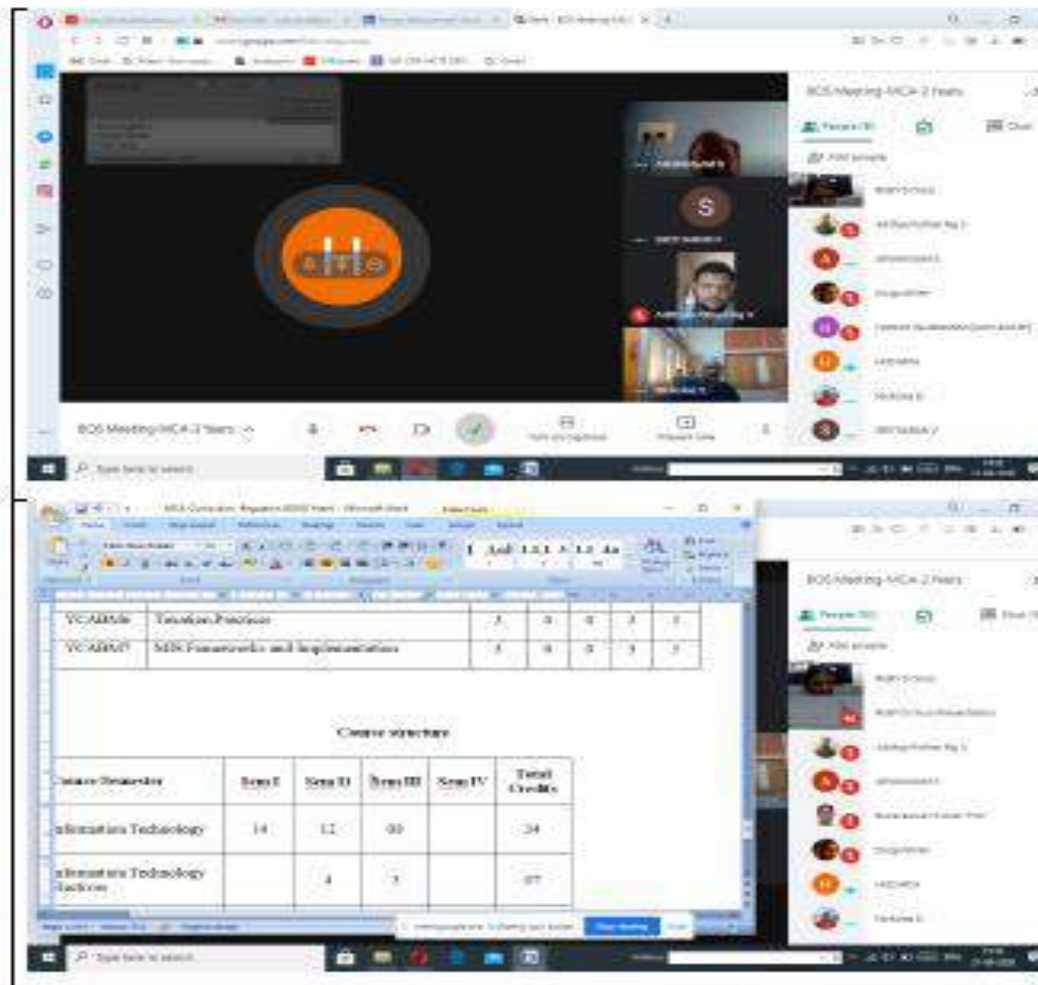
#### Agenda:

1. Analyzing department Mission, Vision, POs, PEOs of MCA.
2. MCA Curriculum and Syllabus- Regulation 2020 (Full Time – 2 years)
3. BCA – Regulation 2018 Revision I
4. Value Added Courses for MCA.
5. Bridge Courses for MCA.
6. Learning Objectives of MCA.
7. Activity Based Teaching and Learning Process
8. Any Other points

#### Members Present:

S.No	Name of the Member	Designation and Address
1.	Dr.J.Jeyachidra BOS Chairperson	Associate Professor & Head Periyar Maniammai Institute of Science & Technology, Vallam.
2	Dr.S.Nickolas (Academic Expert)	Professor Department of Computer Applications, NIT, Tiruchirappalli. <a href="mailto:nickolas@nit.edu">nickolas@nit.edu</a> , <a href="mailto:nickolasnit@gmail.com">nickolasnit@gmail.com</a> 94435 61986,94860 61131
3.	Mr.V.Adithya Pothan Raj (Industry Expert)	Associate Operations Manager CTS, Chennai. <a href="mailto:ajee29@trnsoft.com">ajee29@trnsoft.com</a> 9444028124
4.	Dr. Ms.S.Bhuvaneswari BOS Member Internal	Asso.Prof./CSA Periyar Maniammai Institute of Science & Technology, Vallam.
5.	Ms.D.Ruby BOS Member Internal	Asst.Prof. (SS) Periyar Maniammai Institute of Science & Technology, Vallam.
6.	Mr.S.Arumugam BOS Member Internal	Asst.Prof. (SS) Periyar Maniammai Institute of Science & Technology, Vallam.
7.	Mr.V.Srithar BOS Member Internal	Asst.Prof. (SS) Periyar Maniammai Institute of Science & Technology, Vallam.

8.	Ms.Durga Shree Jayachandran (Alumni)	Associate Software Engineer Accenture, Chennai
9.	T.SathyaPriya	III MCA



### Members Present:

- Ruby D
- Arumugam S
- Durga Shree
- HOD MCA
- Sritharan V
- Nickolas S.
- Adithya Pothan Raj V
- Harish Rajendran [awv-anl 5f]
- Buvanewari S
- Sathya Priya T

### Minutes:

The following suggestions were made in the BOS Meeting

1. Department Vision, Mission, Programme Outcomes, MCA Programme Educational Objectives were discussed. It is focused towards the objectives of the students.
1. The Curriculum and Syllabus of MCA programme (Regulation 2020) is designed as per AICTE norms and bench marking with leading Universities to fulfil the national needs and international needs. The Curriculum and Syllabus of the MCA Regulation 2020 was presented to the BoS Members. The Course and credit distributions have been done based on the Information Technology, Business Management, Mathematics and Skill Oriented courses.
2. Feedback about Curriculum and Syllabus from the stake holders were collected, analyzed with action taken reports and as per their suggestions, above 20% of courses were updated in the MCA (Regulation 2020)
3. MCA Curriculum and Syllabus (Regulation 2020) was recommended by all the BoS Expert members
4. MCA (Regulation 2020), consists of the following newly introduced courses and removed as tabulated below:

S.No	Course Details	Semester	Action Taken
1.	YCA102-Computer Networks	I	Added
2.	YCA105-Mathematical Foundation for Computer Applications	I	Course Name Modified

3.	YCA107-Mathematical Foundation for Computer Applications Lab using Java	1	Course Name Modified
4.	YCA106-Database Management Systems Lab	1	Course Name Modified
5.	YCA201-Advanced Operating System Concepts	2	Added
6.	YCA205-Advanced Operating System Concepts Lab	2	Added
7.	YCA203-Advanced Data Structures	2	Added
8.	YCA307-Mini Project	3	Two Courses Merged
9.	YCA301-Artificial Intelligence and Machine Learning	3	Course Name Modified
10.	YCA304-Artificial Intelligence and Machine Learning Lab using Python	3	Course Name Modified
11.	YCA401-Research Methodology(Paper Publications)	4	Added
12.	YCA302- Computer Communication Networks	1	Removed
13.	YCA401- Network Programming	2	Removed
14.	YCA405- Networks Lab		Removed
15.	YCAEE1- Data Mining and Data Warehousing	2	Added
16.	YCAEE3- High Performance Computing	2	Added
17.	YCAEE9-Cryptography and Information Security	2	Added
18.	YCAEE4-Cloud Computing	3	Added
19.	YCAEE10-Bigdata Analytics	3	Added
20.	YCAEBS- Blockchain Technology	2	Course Name Modified (One Unit introduced as Industry 4.0)
21.	YCAEE1- Programming Languages and Paradigms	2	Removed
22.	YCAEE2-Visual Programming	2	Removed
23.	YCAEE9-Machine Learning	2	Removed
24.	YCAEE4-Advanced Unix Programming	3	Removed

5. Discussed on MCA Regulation 2020 and Learning objectives, it meets the current scenario of the industry requirement.
6. The following value added courses and Bridge Courses are included in MCA programme (Regulation 2020)
  - a. Advanced Java Programming
  - b. Python Programming
  - c. R Programming
  - d. IoT
  - e. Natural Language Processing
  - f. Data Science

g. Robotics Technology

The Bridge Courses are

h. YCA101B-Computer Fundamentals

i. YCA102B-Computer Fundamentals Programming Lab

7. BoS members encouraged Activity Based Learning for the Teaching Learning process and suggested some tools for learning like:
  - a. Google Classroom
  - b. Moodle LMS
  - c. MOOC/SWAYAM Courses
  - d. <http://blogs.umass.edu/onlinetool/>
8. The Board of Studies of Department of Computer Science and Applications recommended the BCA Regulation 2018 Revision 01 will be followed for the students who have joined in the Academic Year 2020-2021.
9. The Board of Studies members recommended the above curriculum and syllabus for MCA programme (Regulation 2020) Full Time – 2 years to be offered by the Department of Computer Science and Applications, Periyar Maniammai Institute of Science & Technology from the academic year 2020 – 2021.

**Dr.J.Jeyachidra**  
**BOS Chairperson**  
**Head & Associate Professor**

**I FEEDBACK COLLECTED, ANALYZED AND ACTION TAKEN**

Alumni Students	:	Yes
Parents	:	Yes
Employers	:	Yes
Students	:	Yes
Academic Experts	:	Yes
Industry Experts	:	Yes

1. MCA Curriculum and syllabus designed as per AICTE norms.

**I A) COMPARISON BETWEEN REGULATIONS 2018 Rev. 01 and 2020**

Semester	Regulation 2018 Rev 01	Regulation 2020 (2 Years)	Addition/ Deletion
	Course name		
I	YCA101-Information Technology		AICTE
	YCA102- Computer Organization and Architecture		AICTE
	YCA103- Data structures and algorithms		AICTE
	YCA104- Mathematical Foundations		AICTE
	YCA105		AICTE



	Accounting and Management Control		
	YCA106- Information Technology lab		AICTE
	YCA107- Programming Lab ( C and Data structures)		AICTE
II	YCA201- Introduction to Management Functions		AICTE
	YCA202- Operating Systems		AICTE
	YCA203- Technical English		AICTE
	YCA204-Probability and Combinatorics		AICTE
	YCA205 Information System Analysis, Design and Implementation		AICTE
	YCA206- Business Programming Lab		AICTE
	YCA207- Operating systems Lab		AICTE
III / I	YCA301- Database Management Systems	YCA101-Database Management Systems	AICTE
	YCA302- Computer Communication Networks	YCA102-Computer Networks	Added
	YCA303- Object Oriented Programming, Analysis and Design	YCA103-Object Oriented Programming, Analysis and Design	AICTE
	YCA304- Management Support Systems	YCA104-Management Support Systems	AICTE
	YCA305- Statistical Computing	YCA105-Mathematical Foundation for Computer Applications	Course Name Modified
	YCA306- Database Management Systems and Java Lab	YCA106-Database Management Systems Lab	Course Name Modified
	YCA307- Statistical Computing Laboratory	YCA107-Mathematical Foundation for Computer Applications Lab using Java	Course Name Modified
IV / II	YCA401- Network Programming	YCA201-Advanced Operating System Concepts	Added
	YCA402- Software Engineering	YCA202-Software Engineering	AICTE
	YCAIT*- IT Elective I	YCAIT*-IT Elective I	AICTE
	YCA403- Organizational Behaviour	YCA203-Advanced Data Structures	Added
	YCABM- BM Elective I Practical	YCABM*-BM Elective I	AICTE
	YCA405- Networks Lab	YCA205-Advanced Operating System Concepts Lab	Added

	YCA406- Case Tools Lab	YCA206-Case Tools Lab	AICTE
V/ III	YCA501- Artificial Intelligence and Applications	YCA301-Artificial Intelligence and Machine Learning	Course Name Modified
	YCA502- Graphics and Multimedia	YCA302-Graphics and Multimedia	AICTE
	YCAIT*- IT Elective II	YCAIT*-IT Elective II	AICTE
	YCABM*- BM Elective II	YCABM*-BM Elective II	AICTE
	YCA503- Optimization Techniques	YCA303-Optimization Techniques	AICTE
	YCA504- Artificial Intelligence and Applications Lab	YCA304-Artificial Intelligence and Machine Learning Lab using Python	Course Name Modified
	YCA505- Optimization Techniques Lab	YCA305-Optimization Techniques Lab	AICTE
	YCA506- Industrial Lectures	YCA306-Industrial Lectures	AICTE
	YCA507- Seminar	YCA307-Mini Project	Courses Merged
	YCA508- Project		
VI/ IV	YCA601- Seminar	YCA401-Research Methodology( Paper Publications)	Course Modified
	YCA602- Project	YCA402-Project	AICTE
	IT Electives	YCAEE3-Data Mining and Data Warehousing	Added
		YCAEE2-High Performance Computing	Added
		YCAEE5-Cryptography and Information Security	Added
		YCAEE4-Cloud Computing	Added
		YCAEE10-Bigdata Analytics	Added
		YCAEE1- Programming Languages and Paradigms	Removed
		YCAEE2-Visual Programming	Removed
		YCAEE9-Machine Learning	Removed
		YCAEE4-Advanced Unix Programming	Removed
	BM Electives	YCABM9- Blockchain Technology	Course Name Modified (One Unit introduced as Industry 4.0)

### III. LIST OF NEWLY INTRODUCED COURSES IN REGULATION 2020

S.No	Course Details	Semester	Action Taken
1.	YCA102-Computer Networks	1	Added
2.	YCA105-Mathematical Foundation for Computer Applications	1	Course Name Modified

3.	YCA107-Mathematical Foundation for Computer Applications Lab using Java	1	Course Name Modified
4.	YCA106-Database Management Systems Lab	1	Course Name Modified
5.	YCA201-Advanced Operating System Concepts	2	Added
6.	YCA205-Advanced Operating System Concepts Lab	2	Added
7.	YCA203-Advanced Data Structures	2	Added
8.	YCA307-Mini Project	3	Two Courses Merged
9.	YCA301-Artificial Intelligence and Machine Learning	3	Course Name Modified
10.	YCA304-Artificial Intelligence and Machine Learning Lab using Python	3	Course Name Modified
11.	YCA401-Research Methodology(Paper Publications)	4	Added
12.	YCA302- Computer Communication Networks	1	Removed
13.	YCA401- Network Programming	2	Removed
14.	YCA405- Networks Lab		Removed
15.	YCAEE1- Data Mining and Data Warehousing	2	Added
16.	YCAEE2- High Performance Computing	2	Added
17.	YCAEE9-Cryptography and Information Security	2	Added
18.	YCAEE4-Cloud Computing	3	Added
19.	YCAEE10-Bigdata Analytics	3	Added
20.	YCAEM9- Blockchain Technology	2	Course Name Modified (One Unit introduced as Industry 4.0)
21.	YCAEE1- Programming Languages and Paradigms	2	Removed
22.	YCAEE2-Visual Programming	2	Removed
23.	YCAEE9-Machine Learning	2	Removed
24.	YCAEE4-Advanced Unix Programming	3	Removed

**IV. COURSES INTRODUCED FOR IMPROVING THE EMPLOYABILITY SKILLS OF THE STUDENTS.**

YES

**VI. VALUE ADDED COURSES PROVIDED**

YES

**VII. OVERALL PERCENTAGE OF CHANGE COMPARED TO REGULATIONS 2017**

MCA – 50%

## 2. Extracts of Minutes of the 36<sup>th</sup> Academic Council held on - 10.10.2020 for MCA programme

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### **MINUTES OF THE THIRTY SIXTH MEETING OF THE ACADEMIC COUNCIL**

**Date** : 10.10.2020 **Venue** : Through Google Meet

**Time** : 11.00 A.M **Place** : PMIST, Vallam – Thanjavur

The Thirty Sixth meeting of the Academic Council of the Periyar Maniammai Institute of Science & Technology (PMIST), Vallam, Thanjavur held on 10.10.2020 at 11.00 a.m. through Google Meet.

Prof.S.Velusami, Hon'ble Vice-Chancellor, chaired the meeting.

The following Academic Council Members were present (Through Google meet):

1. Dr.A.Anand Jerard Sebastine Member
2. Dr.A.P.Aruna Member

#### **BUSINESS BROUGHT FORWARD BY FACULTY OF COMPUTING SCIENCES & ENGINEERING (FCSE)**

**Notes:** The Curriculum & Syllabus recommended by the respective Department Board of Studies will follow the Regulations as listed below:

Agenda	Programme	Semester	Regulation	Remarks
FCSE MCA 36.5.1	MCA (Two Years)	I to IV	2020	Curriculum & Syllabus, Bridge Courses and Value Added Courses. <b>Value Added Courses:</b> a. Advanced Java Programming b. Python Programming c. R Programming d. IoT e. Natural Language Processing f. Data Science g. Robotics Technology <b>Bridge Courses:</b> a.YCA101B-Computer Fundamentals b.YCA102B-Computer Fundamentals Programming Lab

The matter is placed before the Academic Council for approval.

#### **Resolution**

**RESOLVED TO APPROVE** the Curriculum & Syllabi of I to IV Semesters of MCA (2 Years) under full-time Regulation 2020.

### 3. Curriculum and Syllabus for the MCA programme-Before Revision

#### REGULATION 2018 Revision 01

#### SEMESTER-I

Course Code	Course Title	L	T	P	H	C
YCA101	Information Technology	3	0	0	3	3
YCA102	Computer Organization and Architecture	3	2	0	5	4
YCA103	Data Structures and Algorithms	3	2	0	5	4
YCA104	Mathematical Foundations	3	2	0	5	4
YCA105	Accounting and Management Control	3	0	0	3	3
YCA106	Information Technology lab	0	0	4	4	2
YCA107	Programming Lab ( C and Data Structures)	0	0	4	4	2
<b>Total</b>		<b>15</b>	<b>06</b>	<b>08</b>	<b>29</b>	<b>22</b>

#### SEMESTER II

Course Code	Course Title	L	T	P	H	C
YCA201	Introduction to Management Functions	3	0	0	3	3
YCA202	Operating Systems	3	2	0	5	4
YCA203	Technical English	3	2	0	5	4
YCA204	Probability and Combinatorics	3	2	0	5	4
YCA205	Information System Analysis, Design and Implementation	3	0	0	3	3
YCA206	Business Programming Lab	0	0	4	4	2
YCA207	Operating systems Lab	0	0	4	4	2
<b>Total</b>		<b>15</b>	<b>6</b>	<b>08</b>	<b>29</b>	<b>22</b>

### SEMESTER- III

Course Code	Course Title	L	T	P	H	C
YCA301	Database Management Systems	4	0	0	4	4
YCA302	Computer Communication Networks	4	0	0	4	4
YCA303	Object Oriented Programming, Analysis and Design	4	0	0	4	4
YCA304	Management Support Systems	4	0	0	4	4
YCA305	Statistical Computing	4	0	0	4	4
YCA306	Database Management Systems and Java Lab	0	0	4	4	2
YCA307	Statistical Computing Laboratory	0	0	4	4	2
<b>Total</b>		<b>20</b>	<b>0</b>	<b>08</b>	<b>28</b>	<b>24</b>

### SEMESTER- IV

Course Code	Course Title	L	T	P	H	C
YCA401	Network Programming	4	0	0	4	4
YCA402	Software Engineering	4	0	0	4	4
YCAIT*	IT Elective I	4	0	0	4	4
YCA403	Organizational Behaviour	3	0	0	3	3
YCABM*	BM Elective I	4	0	0	4	3
YCA405	Networks Lab	0	0	4	4	2
YCA406	Case Tools Lab	0	0	4	4	2
<b>Total</b>		<b>19</b>	<b>0</b>	<b>08</b>	<b>27</b>	<b>22</b>

### SEMESTER- V

Course Code	Course Title	L	T	P	H	C
YCA501	Artificial Intelligence and Applications	3	0	0	3	3
YCA502	Graphics and Multimedia	3	0	0	3	3
YCAIT*	IT Elective II	3	0	0	3	3
YCABM*	BM Elective II	3	0	0	3	3
YCA503	Optimization Techniques	3	0	0	3	3
YCA504	Artificial Intelligence and Applications Lab	0	0	3	3	2
YCA505	Optimization Techniques Lab	0	0	3	3	2
YCA506	Industrials Lectures	0	0	2	2	2
YCA507	Seminar	0	0	3	3	2
YCA508	Project	0	0	6	6	2
<b>Total</b>		<b>15</b>	<b>0</b>	<b>17</b>	<b>32</b>	<b>25</b>

### SEMESTER-VI

Course Code	Course Title	L	T	P	H	C
YCA601	Seminar	0	0	3	3	3
YCA602	Project	0	0	6	6	12
<b>Total</b>		<b>0</b>	<b>0</b>	<b>09</b>	<b>09</b>	<b>15</b>

**Total Credits :130**

### INFORMATION TECHNOLOGY ELECTIVES

#### IT Elective I

Course Code	Course Title	L	T	P	H	C
YCAEE1	Data Mining and Data Warehousing	4	0	0	4	4
YCAEE2	High Performance Computing	4	0	0	4	4
YCAEE3	Compiler Design	4	0	0	4	4
YCAEE8	System Analysis and Simulation	4	0	0	4	4

YCAEE9	Cryptography and Information Security	4	0	0	4	4
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### IT Elective II

Course Code	Course Title	L	T	P	H	C
YCAEE4	Cloud Computing	3	0	0	3	3
YCAEE5	Distributed Database Management	3	0	0	3	3
YCAEE6	Image Processing	3	0	0	3	3
YCAEE7	Parallel Programming	3	0	0	3	3
YCAEE10	Bigdata Analytics	3	0	0	3	3

### BUSINESS MANAGEMENT ELECTIVES

#### BM Elective I

Course Code	Course Title	L	T	P	H	C
YCABM3	Foundations of Decision Processes	3	0	0	3	3
YCABM4	Investment Technology	3	0	0	3	3
YCABM8	Management of Software Projects	3	0	0	3	3
YCABM9	Blockchain Technology	3	0	0	3	3

#### BM Elective II

Course Code	Course Title	L	T	P	H	C
YCABM1	Managerial Economics	3	0	0	3	3
YCABM2	Corporate Planning	3	0	0	3	3
YCABM5	Business Finance	3	0	0	3	3



YCABM6	Taxation Practices	3	0	0	3	3
YCABM7	MIS Frameworks and Implementation	3	0	0	3	3

### YCA101- INFORMATION TECHNOLOGY

#### Course Outcomes:

- CO1 C Knowledge *Describe* the various processes to express the data communication.
- CO2 C Understand *Understand* the concepts of Hardware and software process.
- CO3 C Remember *Recalls* the concept of operating systems and its languages.
- CO4 C Understand *Distinguish* the networks and *extends* the idea of computer networks and its functions.
- CO5 C Analyze *Illustrate* the concepts of information security and its applications.

Course Code	Course Name	L	T	P	C
YCA101	Information Technology	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		L	T	P	H
		3	0	0	3
<b>UNIT- I: Introduction of IT</b>					<b>9</b>
Information concepts and processing: Evolution of information processing - data information language and communication.					
<b>UNIT- II: Hardware and Software Process.</b>					<b>9</b>
Elements of a computer processing system: Hardware - CPU - storage devices and media - VDU - input-output devices - data communication equipment Software - system software - application software.					
<b>UNIT- III: Operating Systems Overview.</b>					<b>9</b>

Programming languages: Classification - machine code - assembly language - higher level languages - fourth generation languages - Operating systems: Concept as resource manager and coordinator of processor - devices and memory - Concept of priorities - protection and parallelism - Command interpreter - Typical commands of DOS/ UNIX/Network - Gul-Windows.

**UNIT- IV: Computer networks and Data Communication.** **9**

Computers and Communication: Single user - multi-user - work station - client server systems - Computer networks - network protocols - LAN - WAN - Internet facilities through WWW - Mosaic - Gopher - html - elements of Java.

**UNIT –V: Information Security and its Applications.** **9**

Information integrity definition Ensuring integrity Computer security: Perverse software - concepts and components of securit - Preventive measures and treatment - Range of application: Scientific - business - educational - industrial - national level weather forecasting - remote sensing - planning - multilingual applications.

LECTURE	TUTORIAL	TOTAL
<b>45</b>	<b>-</b>	<b>45</b>

**TEXT**

1. Introduction to Information Technology Paperback – February 28, 2018 by V. Rajaraman.
2. Introduction to Information Technology 3<sup>rd</sup> Edition R. Kelly Rainer.

**REFERENCES**

1. Rajaraman V, "Fundamental of Computers" (2nd edition), Prentice Hall of India, New Delhi. 1996.
2. Sanders, D.H .. "Computers Today" McGraw Hill. 1988.
3. Trainer T., et al, "Computers" (4th edition) McGraw Hill, 1994.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2

CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA102 - COMPUTER ORGANIZATION AND ARCHITECTURE

#### Course Outcomes:

- CO1 C Knowledge *Describe* general Instruction types, formats, addressing modes and organization
- CO2 C Understand *Understand* the concept of RISC Vs CISC
- CO3 C Knowledge *Classifies* memory organization and management
- CO4 C Understand *Summarize* various modes of Data transfer
- CO5 C Understand *Explain SPEC Mark*

Course Code	Course Name	L	T	P	C
YCA102	Computer Organization and Architecture	3	1	0	4
<b>C:P:A = 4:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		3	2	0	5
<b>UNIT- I: Instruction Format and Types</b>					<b>15</b>
Principles of Computer design - Software - hardware interaction layers in computer architecture - Central processing unit - Machine language instructions - Addressing modes - Instruction types - Instruction set selection - Instruction cycle and execution cycle.					
<b>UNIT- II: Simple Computer Organization</b>					<b>15</b>
Control unit - Data path and control path design - Microprogramming Vs hardwired control - RISC Vs CISC - Pipelining in CPU design: Superscalar processors.					

<b>UNIT- III: Memory Organization</b>	<b>15</b>
Memory system - Storage technologies - Memory array organization - Memory hierarchy - interleaving - cache and virtual memories and architectural aids to implement these.	
<b>UNIT- IV: I/O Organization</b>	<b>15</b>
Input /output devices and characteristics - Input/output processing - bus interface - data transfer techniques.	
<b>UNIT -V :SPEC Marks</b>	<b>15</b>
I/O interrupts - channels - Performance evaluation - SPEC marks - Transaction Processing benchmarks.	
	<b>LECTURE    TUTORIAL    TOTAL</b>
	<b>45                    30                    75</b>

### TEXT

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.
2. M.Morris Mano "Computer System Architecture", Pearson Education, Third Edition 2007

### REFERENCES

1. Mano, M, "Computer System and Architecture", (3rd edition) Prentice Hall of India, New Delhi, 1994.
2. Pal Chauduri, P., "Computer Organisation and Design", Prentice Hall of India, New Delhi, 1994.
3. Rajaraman, V., and Radhakrishnan, T., "Introduction to Digital Computer Design" (4th edition). Prentice Hall of India, New Delhi, 1997.
4. Stallings. W, "Computer Organization and Architecture, (2nd edition) Prentice Hall of India, New Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	3	3	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2

CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	3	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	11	11	11	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA103-DATA STRUCTURES AND ALGORITHMS

#### COURSE OUTCOMES

<b>CO1</b>	<b>Explain</b> the classification of data types and operations of stack.	Cognitive	Understand
<b>CO2</b>	<b>Describe</b> the functions of queue and its types	Cognitive	Understand
<b>CO3</b>	<b>Describe</b> the operations of linked list and its advantages	Cognitive	Understand
<b>CO4</b>	<b>Recall</b> the function of recursion in various problems.	Cognitive	Understand
<b>CO5</b>	<b>Describe</b> the various types of sorting	Cognitive	Understand

Course Code	Course Name	L	T	P	C
<b>YCA103</b>	<b>Data Structures and Algorithms</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C:P:A = 4: 0:0</b>		L	T	P	H
		<b>3</b>	<b>2</b>	<b>0</b>	<b>5</b>
<b>UNIT –I: Introduction to Data Structures and Stack</b>					<b>15</b>
Definition - Classification of data structures: primitives and non primitive - Operations on data structures – Definition - Array & Linked list representation of stack - operations on stack: Applications of stacks - Infix - prefix and postfix notations - conversion of an arithmetic expression from infix to postfix.					
<b>UNIT- II: Queue</b>					<b>15</b>
Definition - Array & Linked list representation of queue - Types of Queues: Simple queue - circular queue - double ended queue (dequeue) priority queue - operations on all types of queues.					
<b>UNIT- III: Linked List</b>					<b>15</b>

Definition, components of linked list - representation of linked list - advantages and disadvantages of linked list - Types of linked list: Singly linked list - doubly linked list - circular linked list and circular doubly linked list - Operations on singly linked list : creation - insertion - deletion - search and display.

**UNIT – IV: Recursion** **15**

Definition - Recursion in C - writing recursive programs - Binomial coefficient - Fibonacci - GCD - Factorial etc.

**UNIT – V: Tree and Sorting Techniques** **15**

Tree - Binary Tree - complete binary tree - binary search tree - heap tree terminology: Root - Node - Degree of a node and tree - Terminal nodes - Non terminal nodes - Siblings - Level - Edge - Path - depth - Parent node - ancestors of a node - Different types of searching techniques: Bubble sort - Selection Sort- merge sort- insertion - quick sort.

	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
	<b>45</b>	<b>30</b>	<b>0</b>	<b>75</b>

**TEXT BOOKS**

3. Lipshutz, Theory and Problem of Data structures, Schaum’s Outline series, Tata McGraw, 1986.
4. Langsam, Ausenstein Maoshe & M. Tanenbaum: Aaron Data Structures using C and C++, Pearson Education

**REFERENCES**

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 1996
2. Robert L Kruse: Data Structures and program designing using C, 2013.
3. Kamthane: Introduction to Data Structures in C, Pearson Education, 2005

**E – REFERENCES**

1. NPTEL, Data structures and algorithm ,Prof. Hema A Murthy,IIT Madras, Prof. Shankar Balachandran,IIT Madras, Dr. N S. Narayanaswamy, IIT Madras
2. NPTEL, Data structures and algorithm ,Prof. Naveen Garg, IIT Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3

CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA104 - MATHEMATICAL FOUNDATIONS

#### Course Outcomes:

- CO1 C Knowledge *Describe* theory of inference for statement calculus  
CO2 C Understand *Understand* and apply Relation, function and recursion  
CO3 C Knowledge *Describe* and solve Algebraic structure  
CO4 C Understand *Describe* and *solve* problems in paths and graph  
CO5 C Understand *Understand* Tress, List structures and graphs

SUBCODE	SUB NAME	L	T	P	C
YCA104	Mathematical Foundations	3	1	0	4
<b>C:P:A = 4:0:0</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		3	2	0	5
<b>UNIT- I: Mathematical Logic</b>					<b>15</b>
Notation - Connectives Normal forms - Theory of inference for statement calculus.					
<b>UNIT- II: Predicate calculus</b>					<b>15</b>
Inference theory of the predicate calculus - Relations and ordering - Functions - Recursion.					
<b>UNIT- III: Algebraic Structures</b>					<b>15</b>
Groups - Application of residue arithmetic to computers - Group codes.					
<b>UNIT – IV: Graph theory</b>					<b>15</b>
Definition - Paths - reach ability - connectedness - Matrix representation of graphs - Trees.					
<b>UNIT- V : Storage representation and manipulation of graphs</b>					<b>15</b>
Storage representation and manipulation of graphs: Trees - List structures and graphs - Pert and related techniques.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	

	<b>45</b>	<b>30</b>	<b>75</b>
<b>TEXT</b>			
1. Truss, J.K., "Discrete Mathematical Structures for Computer Science", Addison - Wrsley, 1999.			
2. Oscar Levin., "Discrete Mathematics", 2nd Edition			
<b>REFERENCES</b>			
1. Kolman, B., and Busby. R., "Discrete Mathematical Structures for Computer Science", Prentice Hall. 1987.			
2. Sahni, S., "Concepts in Discrete Mathematics". Camelot Publisher. U.S.A. 1981.			
3. Tremblay, J.P., et al. "Discrete Mathematical Structures with Applications to Computer Science" McGraw Hill, 1987.			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### YCA105-ACCOUNTING AND MANAGEMENT CONTROL

Course Outcomes		Domain	Level
CO1	<i>Understand</i> the Basic Accounting and conventions underlying preparation of Financial Statements	Cognitive	Knowledge Understand
CO2	<i>Understand</i> the Income Measurement	Cognitive	Understand
CO3	<i>Understand</i> the concept of Cost Analysis and Control	Cognitive	Understand
CO4	<i>Understand</i> the Cost Analysis for Control	Cognitive	Understand



CO5	<i>Understand</i> the Management Control Systems	Cognitive	Understand
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Course Code	Course Name	L	T	P	C
YCA105	<b>Accounting and Management Control</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C:P:A = 3:0:0</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT I Basic Accounting and conventions</b>					<b>9</b>
Basic Accounting and conventions underlying preparation of Financial Statements: balance sheet, highlighting accounting equation, profit and loss statement; accounting processes; basic accounts, trial balance and financial statements; issues: provisions for bad debts tax, dividends, losses: bad debts, missing information, classification effect, cost of assets, rentals, etc;					
<b>UNIT III Income Measurement</b>					<b>9</b>
Concept of Income Measurement: revenue; recognition and matching costs and revenues; inventory valuation; Depreciation Accounting; Intangible Assets Accounting; Understanding published annual accounts including funds flow statement.					
<b>UNIT III Cost Analysis and Control</b>					<b>9</b>
Basic Cost Concepts: introduction; cost classification; allocation, appointment and absorption; cost centers; Cost Analysis for Managerial Decisions: direct costing, break-even analysis; relevant costs; pricing; pricing-joint costs; make or buy; relevant fixed costs and sunk costs;					
<b>UNIT IV Cost Accounting</b>					<b>9</b>
Cost Analysis for Control: standard costing; variances; material, labour, overhead, sales, and profit; Standard Cost Accounting: budgeting and control; elements of budgeting; control of manufacturing and manufacturing expenses; performances appraisal, evaluation of cost control systems.					
<b>UNIT V Management Control Systems</b>					<b>9</b>
Introduction to Management Control Systems; Goals, Strategies, and Key Variables; Performance Measures; Responsibility Centers and Transfer Price; Investment Centers; Reporting Systems; Management by Objectives; Budgeting and Control; Organizational Relationships in Control; Control Dynamics; Top Management and Control; Strategic and Long-Range Planning; Control of Service Organizations; Control of Projects; Control of Non-Profit Organizations; Control of Multinational Companies.					

	LECTURE	TUTORIAL	TOTAL
	45	0	45

### TEXT

1. Bhattacharya, S.K., and Dearden, John, "Accounting for Management", Prentice Hall of India, New Delhi.
2. Homgren, Sundem and Selto (9th ed), "Introduction to Management Accounting", Prentice Hall of India Pvt. Ltd.

### REFERENCES

1. Chadwick, "The Essence of Financial Accounting", Prentice Hall of India Pvt. Ltd., New Delhi.
2. Chadwick. "The Essence of Management Accounting", Prentice Hall of India Pvt. Ltd., New Delhi.
3. Welch, Hilton and Gordon (5th ed). "Budgeting: Profit Planning and Control", Prentice Hall of India Pvt. Ltd., New Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	2	2	2	1	1	1	2	2
CO 2	2	2	2	2	2	1	1	1	2	2
CO 3	2	2	2	2	2	1	1	1	2	2
CO 4	2	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	10	10	10	10	10	5	5	5	10	10
Course	2	2	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA106- INFORMATION TECHNOLOGY LAB

#### Course Outcomes:

- CO1 P Guided response *Describe* the concepts of PCs functions and its commands.
- CO2 P Guided response *Apply* Unix command for various operations in file.
- CO3 P Guided response *Build* a Power Point Slides with some applications.
- CO4 P Guided response *Build* an any system using MS-Excel.

CO5 A Analyze *Apply* an application using visual basic.

Course Code	Course Name	L	T	P	C
YCA106	Information Technology Lab	0	0	4	2
<b>C:P:A = 0:1:1</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		0	0	4	4
					<b>60</b>
1. Study about PC and its functions MS WINDOWS commands. 2. Write a Unix command/ MS WINDOWS / MS DOS for File creation, editing and directory creation, 3. Create a documentation in MS-word 4. Apply mathematical, statistical, and financial functions in MS-Excel. 5. Create a seminar presentation slide for your own topic in MS-PowerPoint 6. Create a Presentation with animation using MS-Power Point. 7. Develop a project student enrolment using Visual Basic with MS Access. 8. Develop a project Library system using Visual Basic with MS Access. 9. Creation of interactive web sites – Design using HTML and authoring tools 10. Creation of information retrieval system using web, PHP and MySQL					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	2	2	1	2	2	3	3
CO 2	3	3	3	2	2	1	2	2	3	3
CO 3	3	3	3	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	3	3
CO 5	3	2	2	2	2	1	2	2	3	3
Total	14	14	13	10	10	5	10	10	15	15
Course	3	3	3	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA107 -PROGRAMMING LAB ( C and Data Structures)

#### Course Outcomes:

- CO1 C Knowledge *Describe* the concept of C programming and its fundamental  
 CO2 P Guided *Build* an application program using various control statements and  
 response arrays  
 CO3 P Apply *Develop* an application program using structures and unions

		Guided Response	<b>Build</b> a program to implement the operations of stack.
CO4	P	Guided response	<b>Build</b> a program to implement the operations of queue.
CO5	P	Guided response	<b>Build</b> an application to demonstrate the functions of linked list and traversing a tree.

SUBCODE	SUB NAME	L	T	P	C
YCA107	Programming Lab (C and Data Structures)	0	0	4	2
<b>C:P:A = 0.5:1.5:0</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		0	0	4	4
					<b>60</b>

- Perform the following operation in matrix  
(i)Addition (ii)Subtraction (iii)Multiplication (iv)Transpose
- Perform the swapping of two numbers using call by value and call by reference
- Perform following operation on strings using string functions  
(i) concatenation (ii)Copying (iii) Reverse (iv)length of string
- Create a Stack and do the following operations using array.  
(i)Push (ii) Pop (iii) Peep
- Create a Queue and do the following operations using array.  
(i)Add (ii) Remove
- Implement The Operations On Singly Linked List
- Implement the following operations on a binary search tree.  
(i) Insert a node (ii) Delete a node
- Create a binary search tree and do the following traversals  
(i)In-order (ii) Pre order (iii) Post order
- Sort the given list of numbers using insertion sort
- Sort the given list of numbers using quick sort
- Perform the following operations in a given graph 1.Depth first search 2.Breadth first search

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2

CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA201-INTRODUCTION TO MANAGEMENT FUNCTIONS

Course Outcome	Domain	Level
CO1 <i>Describe</i> the concepts of Human resource development system	Cognitive	Knowledge
CO2 <i>Understand</i> the idea of marketing research and organization.	Cognitive	Understand
CO3 Illustrate the concept of Finance Estimation and its functions.	Cognitive	Analyze
CO4 <i>Describe</i> the idea about manufacture plan and quality management.	Cognitive	Understand
CO5 <i>Understand</i> the process of strategic planning	Cognitive	Understand

Course Code	Course Name	L	T	P	C
YCA201	Introduction to Management Functions	3	0	0	3
<b>C:P:A =</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT- I: Human Resource Development</b>					<b>9</b>
Selection - Appraisal - Training and Information Systems.					
<b>UNIT –II: Marketing</b>					<b>9</b>
Concept of marketing mix - Marketing mix elements - product policy and design - pricing - choice of marketing intermediaries - methods of physical distribution - use of personal selling - advertising and sales promotion - marketing research - and marketing organization.					
<b>UNIT- III: Finance</b>					<b>9</b>

Finance function : concept - scope - and its relationship with other functions - Tools of financial analysis : funds and cash flow analysis- ratio - analysis - risk-return trade of - Financial forecasting: profonna income statement and balance sheet - cash flow forecasting under uncertainty - financial planning - estimation and management of working capital: operating cycle concept - inventory - accounts receivables - cash and accounts payables - working capital requirements.

**UNIT- IV: Manufacturing** **9**

Operations Planning and Control : aggregate planning – multiple product batch - production cycles - short ten scheduling of job shop - setting production rate in continuous production systems -activity scheduling in projects - introduction to project time calculations through PERT/CPM - Management of supply chain - materials management: introduction to materials management - systems and procedures for inventory management planning - and procurement of materials - quality management: quality concept and planning - standardizations - quality circles.

**UNIT- V: Strategy** **9**

Firm and its Environment: strategies and resources -industry structure and analysis - evaluation of corporate strategy - strategies for growth and diversification - process of strategic planning.

	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>45</b>	<b>--</b>	<b>45</b>

**TEXT BOOK**

1. Agarwal, R.D., "Organization and Management", Tata McGraw Hill, 1986.

**References**

- 1) Massie, "Essentials of Management". 4th edition, Prentice Hall of India. 1996.
- 2) Brech, Edward Franz Leopold, and E. F. L. Brech. The principles and practice of management. Addison-Wesley Longman Ltd, 1975.
- 3) Willmott, Hugh, ed. Critical management studies. Sage, 1992.
- 4) Stewart, Rosemary. Reality of Management, The. Routledge, 2012.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	1	1	1	1	1	1	2	2
CO 2	2	2	1	1	1	1	1	1	2	2

CO 3	2	2	1	1	1	1	1	1	2	2
CO 4	2	2	1	1	1	1	1	1	2	2
CO 5	1	2	1	1	1	1	1	1	2	2
Total	11	10	5	5	5	5	5	5	10	10
Course	3	2	1	1	1	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA202- OPERATING SYSTEMS

Course Outcomes	Domain	Level
CO1 <i>Explain</i> the operating system concept	Cognitive	Understand
CO2 <i>Understand</i> the process and various process scheduling algorithms <i>Practice</i> for different types of scheduling algorithms	Cognitive Psychomotor	Understand Apply
CO3 <i>Describe</i> various memory management concepts and Interprocess Communication and synchronization <i>Integrates</i> different memory management techniques <i>Apply</i> the fixed size and variable size page replacement algorithm	Cognitive Affective Psychomotor	Understanding Organize Adapt
CO4 <i>Understand</i> the file System and I/O devices <i>Practice</i> for different types of disk scheduling algorithms	Cognitive Psychomotor	Understand Apply
CO5 <i>Explain</i> Performance Measurement, monitoring and evaluation	Cognitive	Understand

Course Code	Course Name	L	T	P	C
YCA202	Operating Systems	3	1	0	4
C:P:A = 4:0:0		L	T	P	H
		3	2	0	5
<b>UNIT- I: Introduction</b>					<b>15</b>
Evolution of operating systems - Types of operating systems - Different views of the operating system - operating system concepts and structure.					
<b>UNIT- II: Processes Management</b>					<b>15</b>
Process concept - systems programmer's view of processes - The operating system services for process management - Scheduling algorithms - Performance evaluation.					
<b>UNIT - III: Memory Management</b>					<b>15</b>

Memory management without swapping or paging - swapping - virtual memory - page replacement algorithms - modeling paging algorithms - design issues for paging systems - segmentation.

**Interprocess Communication and synchronization:**

Need for interprocess synchronization - mutual exclusion - semaphores - hardware sport for mutual exclusion - queuing implementation of semaphores - classical problems in concurrent programming - critical region and conditional critical region - monitors - messages - deadlocks.

<b>UNIT- IV: File Systems</b>	<b>15</b>
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File systems - directories - file system implementation- security protection mechanisms.

**Input/Output**

Principles of I/O Hardware: I/O devices - device controllers - direct memory access - Principles of I/O Software : Goals - interrupt handlers - device drivers -device independent I/O software - User space I/O software - Disks: Disk hardware - scheduling algorithms - Error handling - trac-at-a-time caching - RAM Disks - Clocks: Clock hardware - memory mapped terminals - I/O software -terminals: Terminal hardware - memory mapped terminals - I/O software - Processes and Processors in Distributed Systems: Threads - system models - processor allocation - scheduling - Distributed File Systems: Design - implementation - trends.

<b>UNIT -V: Performance Measurement, monitoring and evaluation</b>	<b>15</b>
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Introduction - important trends affecting performance issues - why performance monitoring and evaluation are needed - performance measures - evaluation techniques - bottlenecks and saturation - feedback loops.

**Case Studies:** MS, DOS. MS WINDOWS, LINUX (UNIX) operating system.

	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>45</b>	<b>30</b>	<b>75</b>

**TEXT**

1. William Stallings, Operating Systems , Prentice Hall of India (P) Ltd, 7<sup>th</sup> edition-2012.

**REFERENCES**

- 1 Deitel.H.M .. "An Introduction to Operating Systems". Addison Wesley Publishing Company 1984.
- 2 Milenkovic, M., "Operating Systems· Concepts and Design".McGraw Hill International Edition Computer Science series 1992.
- 3 Peterson, J.L .. Abraham Silberschatz. "Operating System Concepts". Addison Wesley Publishing Company. 1989.



	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA203-TECHNICAL ENGLISH

#### Course Outcomes

CO1 *Describe* the concept of communication

CO2 *Understand* the presentation technique

CO3 *Understand* about bibliography

CO4 *Explain* about seminar

CO5 *Explain* about group discussion

Domain

Cognitive

Cognitive

Cognitive

Cognitive

Cognitive

Level

Understand

Understand

Understand

Understand

Understand

Course Code	Course Name	L	T	P	C
YCA203	Technical English	3	1	0	4
<b>C:P:A = 4:0:0</b>					
		L	T	P	H
		3	2	0	5
<b>UNIT- I: Introduction</b>					<b>15</b>
Concept of oral communication and written communication - Note taking - Minutes - memos and reference material - essay and precise writing.					
<b>UNIT- II: Presentation Techniques</b>					<b>15</b>
Introduction to presentation - Slide preparation - oral presentation principles, written presentation of technical material					
<b>UNIT – III: Bibliography and Biodata</b>					<b>15</b>
Preparation of bibliography - basic of official correspondence - preparation of bio-data - resume and CVs					
<b>UNIT- IV: Seminar</b>					<b>15</b>

Concept of seminar - benefits and purpose of seminar - workshop - case study(students should be asked to prepare and present seminars during the practice session)

**UNIT- V: Group discussions** **15**

Introduction to Group discussions - types of GD - current trends (should also be used and feedback given to students.)

	LECTURE	TUTORIAL	TOTAL
	45	30	75

**TEXT**

1 Munter, M., "Business Communication: Strategy and Style" Prentice Hall, New Jersey, 1987.

**REFERENCES**

1. The Chicago Manual of Style, 13th Edition, Prentice Hall of India, 1989
2. Gowers, Ernest, "The Complete Words". Penguin, 1973.
3. Ludlow, R., and Panton, F., "The Essence of Effective Communication", Prentice Hall of India Pvt. Ltd. 1995.
4. Menzel, D.H., Jones, H.M., Boyd, L.G., "Writing a Technical Paper". McGraw Hill, 1961.
5. Strunk, W., White. E.B., "The Elements of Style", 3rd Edition, McMillan, 1979.
6. Tubian, K.L., "A Manual for Written of 1erm Papers, Thesis and Dissertation", Univ. of Chicago Press, 1973.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	1	1	1	1	0	1	1	2	1	1
CO 2	1	1	1	1	0	1	1	2	1	1
CO 3	1	1	1	1	0	1	2	2	1	1
CO 4	1	1	1	1	0	1	2	2	1	1
CO 5	1	1	1	1	0	1	2	1	1	1
Total	5	5	5	5	0	5	8	09	5	5
Course	1	1	1	1	0	1	2	3	1	1

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

## YCA204- PROBABILITY AND COMBINATORIES

### Course Outcomes

CO1	Cognitive	Understand	<i>Describe</i> the basics of probability functions.
CO2	Cognitive	Knowledge	<i>Understand</i> the concept of expectation functions and its variance.
CO3	Cognitive	Knowledge	<i>Describe</i> and <i>apply</i> various types of distribution functions
CO4	Cognitive	Understand	<i>Describe</i> and <i>solve</i> problems in permutations and combinations on objects.
CO5	Cognitive	Understand	<i>Understand the</i> Recurrence Relations

Course Code	Course Name	L	T	P	C
YCA204	Probability and Combinatorics	3	1	0	4
		L	T	P	H
C:P:A = 4:0:0		3	2	0	5
<b>UNIT- I : Probability – Basics</b>					<b>15</b>
Sample space - Events - Axioms - Conditional probability - Bayes rule - Random variables: Discrete and continuous - Distribution and density functions - Marginal and conditional distributions - Stochastic independence.					
<b>UNIT -II : Expectations</b>					<b>15</b>
Expectation of a function - Conditional expectation and variance -Moment generating function - Cumulant generating functions - Characteristic functions.					
<b>UNIT – III: Distributions and its types</b>					<b>15</b>
Discrete and continuous distributions.					
<b>UNIT- IV: Permutations and Combinations</b>					<b>15</b>
Distinct and non-distinct objects - Generating functions for combinations - Enumerators for permutations- Distribution of distinct objects.					
<b>UNIT- V: Recurrence relations</b>					<b>15</b>
Linear and with two indices - Principles of inclusion and exclusion - Formula derangement - Restrictions on relative positions.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>45</b>	<b>30</b>	<b>75</b>	
<b>TEXT</b>					
1. D.P.Apte , “Probability and Combinatorics”, Scholarly Editions,2013.					

## REFERENCES

1. Liu, C.L., "Introduction to Combinatorial Mathematics". McGraw Hill. 1996.
2. Ross, S., "A First Course in Probability", Collier Macmillan, New York, 1976.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	1	0	1	0	1	1	1	1	1
CO 2	3	1	0	1	0	1	1	1	1	1
CO 3	2	2	2	1	1	1	1	1	1	1
CO 4	2	2	2	1	1	1	1	1	1	1
CO 5	1	2	1	1	0	1	1	1	1	1
Total	11	8	5	5	2	5	5	5	5	5
Course	3	2	2	1	1	1	1	1	1	1

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

## YCA205-INFORMATION SYSTEM ANALYSIS, DESIGN AND IMPLEMENTATION

Course Outcomes	Domain	Level
CO1 <i>Describe</i> various models and Design	Cognitive	Knowledge Understand
CO2 <i>Understand</i> the modeling concept <i>Practice</i> for Developing a Proposal	Cognitive Psychomotor	Understand Apply
CO3 <i>Understand</i> various system design methodologies and tools <i>Practice</i> for Application Development Methodologies and CASE tools	Cognitive Psychomotor	Understand Apply
CO4 <i>Understand</i> Object oriented analysis and design and Object oriented analysis data bases	Cognitive	Understand
CO5 <i>Describe</i> Managerial Issues in Software Projects	Cognitive	Understand

Course Code	Course Name	L	T	P	C
YCA205	Information System Analysis, Design and Implementation	3	0	0	3
<b>C:P:A = 2:1:0</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>

<b>UNIT I Overview of Systems Analysis and Design</b>	<b>9</b>
Systems Development Life Cycle, Concept and Models: requirements determination, logical design, physical design; test planning implementation planning and performance evaluation; communication, interviewing, presentation skills; group dynamics; risk and feasibility analysis; group-based approaches. JAD, structures walkthroughs, and design and code reviews; prototyping; database design; software quality metrics; application categories software package evaluation and acquisition.	
<b>UNIT III Information requirement Analysis</b>	<b>9</b>
Process modelling with physical and logical data flow diagrams, data modelling with logical entity relationship diagrams; Developing a Proposal: Feasibility study and cost estimation.	
<b>UNIT III System Design</b>	<b>9</b>
Design of input and control, design of output and control, file design/database design, Process design, user interface design; prototyping; software constructions; documentation. Application Development Methodologies and CASE tools: Information engineering, structured systems analysis and design and object oriented methodologies for application development data modeling, process modeling, user interface design and prototyping; use of computer aided software engineering (CASE) tools in the analysis, design and implementation of information systems.	
<b>UNIT IV Design and Implementation of OO platforms:</b>	<b>9</b>
Object oriented analysis and design through object modeling technique, object modeling, dynamic modeling and functional modeling, object oriented design and object oriented programming systems for implementation, object oriented data bases.	
<b>UNIT V Managerial Issues in Software Projects</b>	<b>9</b>
Introduction to software markets; planning of software projects, size and cost estimations; project scheduling; measurement of software quality and productivity; ISO and capability maturity models for organizational growth.	
	<b>LECTURE    TUTORIAL    TOTAL</b>
	<b>45                    0                    45</b>
<b>TEXT</b>	
Senn, LA., "Analysis and Design of Information Systems". Tata McGraw Hill Book Company, 1986.	
<b>REFERENCES</b>	
1.Haryszkiewicz, LT., "Introduction of Systems Analysis and Design". Prentice Hall of India, 1989.	
2.Rajaraman, V, "Analysis and Design of Information Systems". Prentice Hall of India, 1991.	
3.Senn, LA., "Analysis and Design of Information Systems". Tata McGraw Hill Book Company, 1986.	
4.Whiten, I.K., Bentley, L.D., Beslow, V.M., "Systems Analysis and Design Methods". Galgotia Publications Pvt. Ltd. 1994.	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3

CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA206 - BUSINESS PROGRAMMING LAB

CO1: Practice various methods to define financial and economic development

CO2: apply for accounting system

CO3: Describe and apply various managerial problems

CO4: solve problem for Retailers

CO5: Solve the Real time Business problem

Understand Credit rating information

Course Code	Course Name	L	T	P	C
YCA206	Business Programming Lab	0	0	4	2
		L	T	P	H
<b>C:P:A = 0:1:1</b>		<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
					<b>60</b>

Laboratory exercises covering usage of COBOL for handling sequential, indexed sequential and random access files, report generation with COBOL. Screen management in COBOL. Exercises must be chosen to illustrate common business operations such as accounting, inventory management, and personnel file manipulation and information retrieval. Some sample problems are given below:

1. A system for journal acquisition in a library. A bus passenger reservation system.
2. An electricity billing system.
3. A fixed deposit accounting system for a Finance Company. Hotel room booking.
4. Book issues and receipts in a library;
5. Insurance premium calculation and issuing reminders. A hospital management system.
6. A system to generate product pages and profiles for a shopping cart.
7. To Update Details of Employee using Files Manipulation.
8. A system to be used in retail and wholesale settings to keep track of products from sales and purchasing
9. E-Health care System.

10. A system for booking cab for transport facilities.			
	<b>LECTURE</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
	<b>0</b>	<b>60</b>	<b>60</b>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### **YCA207-OPERATING SYSTEM LAB**

**CO1: Practice** the operating system concept

**CO2: Practice** for different types of scheduling algorithms

**CO3: Apply** the fixed size and variable size page replacement algorithm

**CO4: Practice** for different types of disk scheduling algorithms

**CO5: Evaluate** Performance Measurement, monitoring and evaluation

<b>Course Code</b>	<b>Course Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>YCA207</b>	<b>Operating System LAB</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

<b>C:P:A =</b>					
<b>0:1:1</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
<ol style="list-style-type: none"> <li>1. Simulate the FCFS, SJF, Priority- CPU Scheduling Algorithms.</li> <li>2. Simulate MVT and MFT</li> <li>3. Simulate Bankers algorithm for Deadlock Avoidance</li> <li>4. Simulate Bankers Algorithm for deadlock Prevention</li> <li>5. Simulate FIFO Page Replacement Algorithms</li> <li>6. Simulate LRU Page Replacement Algorithms</li> <li>7. Simulate Optimal Page Replacement Algorithms</li> <li>8. Simulate Paging Technique of Memory Management</li> <li>9. Simulate FSFC, SCAN,CSCAN -Disk Scheduling algorithms</li> <li>10. Simulate LOOK,CLOOK-Disk Scheduling algorithms</li> </ol>					
	<b>LECTURE</b>	<b>PRACTICAL</b>	<b>TOTAL</b>		
	<b>0</b>	<b>60</b>	<b>60</b>		

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	3	2	2	2	1	2	2	3	3
CO 4	3	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	15	14	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA301- DATABASE MANAGEMENT SYSTEMS

#### Course Outcomes:

- CO1 C Knowledge *Describe* the database architecture and its application
- CO2 C Understand *Describe* about the relational model and algebra
- CO3 C Understand *Explain* the data model and accessing of data.



- CO4 C Knowledge *Describe* the normalization concept for a table of data
- CO5 C Understand *Illustrate* the query technical processing in database management

Course code	Course name	L	T	P	C
YCA301	Data Base Management Systems	4	0	0	4
C:P:A = 4:0:0		L	T	P	H
		4	0	0	4
<b>UNIT- I: Introduction to database Management System</b>					<b>12</b>
Basic concepts-Database & Database Users-Characteristics of the Database-Database Systems-Concepts & Architecture-Data Models. Schemas & Instances-DBMS Architecture & Data Independence-Data Base languages & Interfaces-Data Modeling using the Entity-Relationship Approach					
<b>UNIT- II : Relational Model Concept</b>					<b>12</b>
Relational Model - Languages & Systems - Relational-Data Model & Relational -Algebra Relational Model Concepts-Relational Model Constraints-Relational Algebra-SQL – A Relational Database Language-Data Definition in SQL-View & Queries in SQL-Specifying Constraints & Indexes in SQL-Specifying Constraints & Indexes in SQL a Relational Database Management Systems-ORACLE/INGRES					
<b>UNIT- III : Data model</b>					<b>12</b>
Conventional Data Models & Systems Network-Data Model & IDMS Systems Membership types & options in a set DML for the network model-Navigation within a network database- Hierarchical Data Model & IMS System-Hierarchical Database structure- HSAM - HISAM - HDAM & HIDAM organization-DML for hierarchical model-Overview of IMS					
<b>UNIT- IV: Relational Data Base Design</b>					<b>12</b>
Relational Data Base Design-Function Dependencies & Normalization for Relational - Databases - Functional Dependencies-Normal forms based on primary keys (1NF, 2NF, 3NF & BCNF)-Lossless join & Dependency preserving decomposition					
<b>UNIT- V: Concurrency Control &amp; Recovery Techniques</b>					<b>12</b>
Concurrency Control & Recovery Techniques-Concurrency Control Techniques-Locking Techniques-Time stamp ordering-Granularity of Data items-Recovery Techniques- Recovery concepts-Database backup and recovery from catastrophic failures - Concepts of Object oriented data base management systems					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	

	<b>60</b>	<b>0</b>	<b>60</b>
<b>TEXT</b>			
1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010.			
2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition, 2002			
<b>REFERENCES</b>			
1. Date, C.J., "An Introduction to Database Systems", Narosa Publishing House, New Delhi.			
2. Desai, B', "An Introduction to Database Concepts", Galgotia Publications, New Delhi.			
3. Elmsari and Navathe, "Fundamentals of Database Systems", Addison Wesley, New York.			
4. Ullman, J.D., "Principles of Database Systems", Galgotia Publications, New Delhi			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	3	3	3	2	2	3	3
CO 2	3	3	3	2	2	2	2	2	3	3
CO 3	3	2	2	2	2	2	2	2	3	3
CO 4	2	3	2	2	2	2	2	2	2	2
CO 5	3	2	2	2	2	2	2	2	2	2
Total	14	13	12	11	11	11	10	10	13	13
Course	3	3	3	3	3	3	1	1	3	3

0-No relation    3- High relation    2- Medium relation    1- Low relation

### YCA302 COMPUTER COMMUNICATION NETWORKS

#### Course Outcomes:

- CO1 C Understand *Define* various methods of topology
- CO2 C Understand *Understand* and apply layer protocol
- CO3 C Understand *Illustrate* various counting and inclusion theory
- CO4 C Understand *Describe* LAN concepts
- CO5 C Understand *Explain* TCP/IP

Course code	Course name	L	T	P	C
YCA302	Computer Communication Networks	4	0	0	4

<b>C:P:A = 4:0:0</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>UNIT- I: Introduction to computer network</b>				<b>12</b>
Advantages of networks - structure of the communications network - point-to-point and multidrop circuits - data flow and physical circuits - network topologies - topologies and design goals - Hierarchical topology - horizontal topology (Bus) - star topology - ring topology - mesh topology - The telephone network - switched and non-switched options - fundamentals of communications theory - channel speed and bit rate - voice communications and analog waveforms - bandwidth and the frequency spectrum - connecting the analog and digital worlds - digital worlds - digital signals - the modem - asynchronous and synchronous transmission - Wide area and local networks - connection oriented and connectionless networks, classification of communications protocols - time division multiple access (TDMA) - time division multiplexing (TDM) - carrier sense (Collision) systems - token passing - peer-to-peer priority systems - priority slot - carrier sense (collision free) systems - token passing (priority) systems.				
<b>UNIT- II: Layered Protocols and the OSI model</b>				<b>12</b>
Goals of Layered Protocols - network design problems - communication between layers - introduction to standard organizations and the OSI model - standards organizations - Layers of OSI - OSI status - Polling/Selection Protocols : Character and bit protocols - binary synchronous control (BSC) HDLC - HOLC options - HDLC frame format - code transparency and synchronization - HDLC transmission process - HDLC subsets - SDLC - Protocol conversion.				
<b>UNIT- III: Local Area Networks</b>				<b>12</b>
Way LANs - Primary attributes of a LAN - Broadband and baseband and base LANs - IEEE LAN standards - e-lationship of the 802 standards to the ISO/CCITT model - connection options with LANs - LLC and MAC protocol data units - LAN topologies and protocols - CSMA/CO and IEEE 802.3 - token ring (Priority) - token bus and IEEE 802.4 - metropolitan area networks (MANs) - ANSI fiber distributed data interface - Switching and Routing in Networks: Message switching - packet switching - when and when not to use packet switching - packet routing - packet switching support to circuit switching networks.				
<b>UNIT- IV: The X.25 Network and Supporting Protocols</b>				<b>12</b>
Features of X.25 - Layers of X.25 and the Physical layer - X.25 and the data link layer - companion standards to X.25 - features of X.25 - X.25 channel options - flow control principles - other packet types - X.25 logical channel states - packet formats - Internet working - connectionless mode networks - the frame relay and X.25 stacks.				
<b>UNIT- V: TCP/IP and Personal Computer Networks</b>				<b>12</b>
TCP/IP and internetworking - example of TCP/IP operations - related protocols ports and sockets - The IP address structure - major features of IP - IP datagram - Major IP services - IP source routing - value of the transport layer - TCP - Major features of TCP - passive and				

active operation - the transmission control block (TCP) - route discovery protocols - examples of route discovery protocols - application layer protocols

Personal computer communications: Characteristics - error handling - using the personal computer as a server - linking the personal computer to mainframe computers - tilt: transfer on personal computers - personal computers and local area networks - network operating systems (NOSs) - common IBM PC LAN protocol stacks.

	LECTURE	TUTORIAL	TOTAL
	60	0	60

**TEXTBOOK**

1. Andrew S. Tanenbaum, Computer Networks, Fourth Edition, Prentice Hall PTR; 4th edition, 2002
2. Computer Networking: A Top-Down Approach, by J. F. Kurose and K. W. Ross, Addison Wesley, 5th Edition, March 2009, ISBN-13: 978-0136079675. (Chapters 1-6)

**REFERENCE**

1. Black, V., "Computer Networks· Protocols, Standards and Interfaces", Prentice Hall of India, 1996
2. Stallings, W., "Computer Communication Networks", (4th edition). Prentice Hall of India.1993.Tannebaum, A.S .. "Computer Networks", Prentice Hall of India, 19'81.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

**YCA303 - OBJECT ORIENTED PROGRAMMING, ANALYSIS AND DESIGN**

**Course Outcomes**

CO1 C Knowledge *Describe* various methods to define object modelling

CO2 C Understand *Understand* and construct modeling concepts

- CO3 C Knowledge *Describe* and *Discuss the* concepts of operations
- CO4 C Knowledge *Describe* and apply the concepts of designs
- CO5 C Knowledge *Describe* the concepts of implementation of an application

Course code	Course name	L	T	P	C
YCA303	<b>Object Oriented Programming, Analysis and Design</b>	4	0	0	4
<b>C:P:A = 4:0:0</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		4	0	0	4
<b>UNIT- I: Object modeling</b>					<b>12</b>
Object modelling: Objects and classes - Links and associations - Generalization and inheritance.					
<b>UNIT- II: Grouping constructs</b>					<b>12</b>
Grouping constructs - Aggregation - Generalization as extension and restriction -Multiple inheritance - Meta data - candidate keys - Dynamic modelling: Events and states Nesting – Concurrency					
<b>UNIT – III: Functional modeling</b>					<b>12</b>
Functional modelling: Data flow diagrams - Specifying operations - Analysis: Object modelling - Dynamic modelling - functional modelling - Adding operations - Iteration.					
<b>UNIT- IV: System design and object design</b>					<b>12</b>
System design: Subsystems - Concurrency - Allocation to processors and tasks - Management of data stores - Control implementation -. Boundary condition - Architectural frameworks - Object design: Optimization - implementation of control - Adjustment of inheritance - Design of associations - Documentation - Comparison of methodologies.					
<b>UNIT -V : Implementation</b>					<b>12</b>
Implementation: Using a programming language - a database system - Programming styles - reusability - extensibility - robustness - Programming-in-the-large - case study.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>60</b>	<b>0</b>	<b>60</b>	

### TEXT

1. Craig Larman, "Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education, 2005
2. Alan Dennis, Barbara H. Wixom, and David Tegarden, Systems Analysis And Design with UML Version 2.0—An Object-Oriented Approach, 3rd edition, John Wiley & Sons, Inc., 2009 (required)
3. T5. Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison Wesley.

4. OBJECT-ORIENTED ANALYSIS AND DESIGN With applications SECOND EDITION Grady Booch Rational Santa Clara, California

**REFERENCES**

1. Booch, G., "Object Oriented Analysis and Design". 2nd edition, Benjamin/Cummins Publishing Co .. Redwood City, CA, U.S.A., 1994.
2. Rebecca Wirfs-Brock, et. al, "Designing Object Oriented Software", Prentice Hall of India.1996.
3. Rumbaugh, J., Et al "Object Oriented Modelling and Design". Prentice Hall of India, New Delhi, 1991

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

**YCA304-MANAGEMENT SUPPORT SYSTEMS**

**Course Outcomes**

- CO1 C Knowledge *Discuss*about DSS concept and components
- CO2 C Understand *Describe*the data and model management for DSS
- CO3 C Knowledge *Describe*about various DSS functionality
- CO4 C Understand *Understand*the concept of DSS Interface and Group discussion
- CO5 C Understand *Describe* Expert System

Course code	Course name	L	T	P	C
YCA304	Management Support Systems	4	0	0	4
C:P:A = 4:0:0		L	T	P	H
		4	0	0	4

<b>UNIT- I: Introduction</b>	<b>12</b>
Introduction to the concept of Decision Support System - Components of DSS - Dialogue Management	
<b>UNIT –II: Decision Support System</b>	<b>12</b>
Data Management and Model Management for DSS - Examples of different type of DSS - Systems Analysis and Design for DSS	
<b>UNIT – III: DSS functionality</b>	<b>12</b>
Models in the context of DSS - Algorithms and Heuristics - DSS Applications in different functions	
<b>UNIT- IV:Interface and Group Discussion</b>	<b>12</b>
Design of interfaces in DSS - An overview of DSS generators - Group Decision in Support Systems (GDSS) and Decision Conferencing.	
<b>UNIT -V :Introduction of Expert Systems</b>	<b>12</b>
Introduction of Expert Systems - Expert Systems in Management - Case Study on Expert System - Introduction to GIS - MSS based on GIS - Case Studies; Executive Information Systems (EIS).	
	<b>LECTURE    TUTORIAL    TOTAL</b>
	<b>60                    0                    60</b>

### **TEXT**

1. I.Lucas, H.C., "Information system concepts for management", 5th edition, McGraw Hill, New York. 1994.
2. W S Jawadekar , A O'Brien ., "Management Information Systems"
3. Laaudon and Ludon, "Management Information Systems".

### **REFERENCES**

1. Bhatnagar, S.C. and Ramani K. V., "Computers and Information Management", Prentice Hall of India. New Delhi, 1992.
2. Issue dedicated of GDSS & Expert Systems, JMIS, 10, 3, 1993-94.
3. Kroenke, D., "Management information systems", 2nd edition, Mitchell McGraw Hill, New York. 1992.
4. Maryam Alvi, "Group Decision support Systems, Info. Sys. Mgt (ISM)", Vol. 8. No.3 Summer 91 .

5. Sprague, R.H., and McNurlin, B.C., "Information Systems Management in Practice", 3rd ed.
6. Prentice Hall international. New Jersey, 1993.
7. Sprague. R.H. and Carlson, E.D . ."Building Effective Decision Support Systems", Prentice Hall. New Jersey, 1982.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	1	1
CO 2	2	1	1	1	1	1	1	1	1	1
CO 3	2	2	1	1	1	1	1	1	1	1
CO 4	2	2	1	1	1	1	1	1	1	1
CO 5	1	2	1	1	1	1	1	1	1	1
Total	09	08	05	05	05	05	05	05	05	05
Course	03	02	01	01	01	01	01	01	01	01

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### YCA305 -STATISTICAL COMPUTING

**Course Outcomes:**

- CO1    C    Knowledge        *Discuss the basic fundamentals of statistics and measures*
- CO2    C    Understand        *Identify the concept of sampling technique*
- CO3    C    Knowledge        *Describe about the charts and analysis*
- CO4    C    Understand        *Discuss about the statistics analysis*
- CO5    C    Understand        *Describe the various implementation*

<b>Course Code</b>	<b>Course Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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<b>YCA305</b>	<b>Statistical Computing</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>C:P:A = 4:0:0</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>UNIT- I: Introduction</b>					<b>12</b>
Basic Statistics: Measures of central tendencies - Measures of dispersion - Frequency distributions - Moments - Correlation coefficient - Regression.					
<b>UNIT- II: Sampling statistical computing</b>					<b>12</b>
Sampling: Theory of sampling - population and sample - Survey methods and estimation Statistical inference - Testing of hypothesis and inference					
<b>UNIT- III: Statistics For Business</b>					<b>12</b>
Computing frequency charts - Regression analysis.					
<b>UNIT- IV: Data Analysis</b>					<b>12</b>
Time series and forecasting					
<b>UNIT- V: Implementation</b>					<b>12</b>
Implementation: Using a programming language - a database system - Programming styles - reusability - extensibility - robustness - Programming-in-the-large - case study.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>60</b>	<b>0</b>	<b>60</b>	
<b>TEXT</b>					
1. Tanner, M. A., "Tools for Statistical Inference: Methods for the Exploration of Posterior Distribution" Springer Verlag: New York., third Edition., 1996					
<b>REFERENCES</b>					
1. Affi, A.A., "Statistical Analysis: A Computer Oriented Approach". Academic Press, New York, 1979. Hogg, R. v..Et. Al., "Introduction to Mathematical Statistics", American Publishing, New York. 1980.					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	2	2	1	2	2	2	2	2	2
CO 2	3	2	2	2	2	2	2	2	2	2
CO 3	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	2	1	2	2	2	2	2	2
CO 5	2	2	2	2	2	2	2	2	2	2

Total	12	10	10	8	10	10	10	10	10	10
Course	3	2	2	1	2	2	2	2	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA306 -DATABASE MANAGEMENT SYSTEMS LAB

#### Course Outcomes:

CO1	P	Guided response	<b>Build</b> the concept of DBMS programming and its fundamental
CO2	P	Guided response	<b>Build</b> an application program using concepts
CO3	P	Apply Guided Response	<b>Develop</b> an application program using a data model <b>Develop</b> the query technical processing in database managements
CO4	P	Guided response	<b>Explain</b> and <b>Implement</b> the normalization concept for a table of data
CO5	A	Apply	Apply the query technical processing in database managements

Course code	Course name	L	T	P	C
YCA306	DBMS Laboratory	0	0	4	2
C:P:A = 0:1.5:0.5		L	T	P	H
		0	0	4	4
					60`
1. Create table in SQL using Accounting for a shop database 2. Develop a Database design in E-R model and Normalization using Database manager for a magazine agency or newspaper agency 3. Implement the Nested Queries using Ticket booking for performances 4. Create views for a particular table using Preparing greeting and birth day cards Personal accounts - insurance, loans, mortgage payments etc. 5. Implement Join operations in SQL using Doctor's diary, billing 6. create a program to implement JDBC connectivity using Personal bank account 7. create a program to implement ODBC connectivity using Class marks management 8. Create a webpage for Video tape library using JDBC Connectivity 9. How to update a data by using JDBC connectivity with Personal library.					

10. Create a webpage for Class marks management library using JDBC Connectivity.
11. Write PL/SQL procedure for an application using Hostel accounting
12. Write PL/SQL procedure for an application using History of cricket scores
13. Write PL/SQL procedure for an application using Cable transmission program manager

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### **YCA307 - STATISTICAL COMPUTING LABORATORY**

#### **Course Outcomes:**

- CO1 P Guided Response *Practice the basic Computer generation of random numbers*
- CO2 A Apply *Understand* and apply set theory and Relations
- CO3 P Guided Response *Describe* various counting and inclusion theory
- CO4 A Apply *Apply* frequency charts for large data sets
- CO5 A Apply *Apply* statistical package to perform factor analysis and tests of significance

Course code	Course name	L	T	P	C
<b>YCA307</b>	<b>Statistical Computing</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>
<b>C:P:A = 0:1:1</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
					<b>60</b>

1. Computer generation of random numbers with different distributions.
2. Writing a questionnaire analysis program for data from surveys.
3. Analysis of significance of the results of survey.

4. Curve fitting to experimental data.
5. Programs to obtain frequency charts for large data sets and fitting a distribution.
6. Use of a statistical package to perform factor analysis and tests of significance.
7. Calculating and displaying regression statistics.
8. Real Statistics Using Excel
9. Calculating and displaying correlation statistics

	LECTURE	PRACTICAL	TOTAL
	0	60	60

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### YCA401- NETWORK PROGRAMMING

#### Course Outcomes:

- CO1 C Knowledge    *Describe* various methods to define protocols and System Network Architecture
- CO2 C Understand    *Understand* and apply Socket Implementation
- CO3 C Knowledge    *Describe* and *apply* various Winsock programming
- CO4 C Understand    *Describe* and *Apply* Novel IPX/SPX
- CO5 C Understand    *Understand* Advanced programming applications.

Course Code	Course Name	L	T	P	C
YCA401	Network Programming	4	0	0	4
<b>C:P:A = 4:0:0</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>



CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA402 - SOFTWARE ENGINEERING

#### Course Outcomes:

- CO1 C Knowledge *Describe* various methods to define lifecycle models.
- CO2 C Understand *Understand* and analyse the software inspections
- CO3 C Knowledge *Describe* and *apply* various software tools
- CO4 C Understand *Describe* and *solve* issues in modern GUI
- CO5 C Understand *Understand* CASE tools and Software configuration management.

Course Code	Course Name	L	T	P	C
YCA402	Software Engineering	4	0	0	4
<b>C:P:A = 4:0:0</b>					
		L	T	P	H
		4	0	0	4
<b>UNIT- I:Software life cycle</b>					<b>12</b>
Models: Waterfall, Spiral - Prototyping Fourth generation techniques - SW Process - Software requirements specification (SRS)Fact-Finding Techniques - Characteristics of a good SRS: Unambiguous. Complete - Verifiable - Consistent - Modifiable - Traceable and usable during the operation and Maintenance phase - Prototype outline for SRS.					
<b>UNIT- II: Software Inspection</b>					<b>12</b>
Communication Skills for the System Analyst - Review/Inspection Procedure:Document. Composition of the inspection team - check list - reading by the inspectors - Recording of					

the defects and action recommended - Students should practice inspecting small requirement specifications for good characteristics.

**UNIT- III: System Analysis and SW Design** **12**

SA tools & Techniques - DFD - Entity Relationship Diagrams - Project Dictionary - System Design Tools and Techniques - Prototyping - Structured Programming.

**UNIT- IV: User Interface Design and User Manual** **12**

Elements of good design - Design issues - Features of a modern GUI - Menus - scrolling - windows - Icons - Panels - Error messages, etc.

User Profile - Contents of an User Manual: Student is urged to install and use a software using its user manual and report the strengths and weaknesses of that user manual.

**UNIT- V: Software Configuration Management and CASE** **12**

**Software Configuration Management**

Base Line - SCM process - Version Control - Change Management.

**Computer Aided Software Engineering**

CASE - Tools for Project management Support - Analysis & design - Programming - Prototyping - Maintenance - Future of CASE.

	LECTURE	TUTORIAL	TOTAL
	60	0	60

**TEXT**

1. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
3. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
4. Ian Sommerville, Software Engineering, Addison Wesley.
5. Kassem Saleh, "Software Engineering", Cengage Learning.
6. Pfleeger, Software Engineering, Macmillan Publication

**REFERENCES**

1. Beizer, B., "Software Testing Techniques", Second Edition. Van Nostrand Reinhold. New York. 1990.
2. IEEE Guide to Software Requirements Specifications, Std 830-1984. In" IEEE Standards Collection. 1993. Available from IEEE Standards Board, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. NJ, USA.
3. IEEE Standard for Software User Documentation, Std 1063-1987.
4. Pressman, R.S., "Software engineering" A Practitioner's Approach", Third Edition, McGraw Hill. International Edition, 1992.
5. Whitten, Bentley and Barlow, "System Analysis and Design Methods", Second Edition, Galgotia Publications, 1996.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	2	2	1	1	1	2	2
CO 2	3	3	3	2	2	1	1	1	2	2
CO 3	3	3	3	2	2	1	1	1	2	2
CO 4	3	3	3	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	14	14	10	10	5	5	5	10	10
Course	3	3	3	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### **YCA403 - ORGANIZATIONAL BEHAVIOUR**

#### **Course Outcomes:**

- CO1 C Knowledge *Describe* various methods to analyze Organizational phenomena.
- CO2 C Understand *Understand* and apply interpersonal group processes
- CO3 C Knowledge *Describe* and *apply* various structures and its functionalities
- CO4 C Understand *Describe* and *solve* problems in organizational behaviors
- CO5 C Understand *Understand* methodologies and its behaviors

Course Code	Course Name	L	T	P	C
YCA403	Organizational Behaviour	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		L	T	P	H
		3	0	0	3
<b>UNIT- I: Introduction</b>					<b>09</b>
Introduction to Organizations and Individuals - What is an organization - components of organization - nature and variety of organizations (in terms of objectives, structure etc.) - models of analysing organizational phenomena - organizational and business variables - organizations in the Indian context - institutions and structure - basic roles in an organization, etc., perception - attitudes - motives (achievement, power and affiliation), commitment - values creativity and other personality factors - profile of a manager and an entrepreneur.					
<b>UNIT -II: Interpersonal and Group Processes</b>					<b>09</b>



Interpersonal and Group Processes - Interpersonal trust - understanding the other person from his/her point of view - interpersonal communication - listening - feedback - counselling - transactional analysis - self-fulfilling prophecy, etc., leadership - motivating people - working as a member of a team- team functioning - team decision-making - team conflict resolution - team problem solving.

**UNIT – III: Structures and its Functionalities** **09**

Organizational Structure and Integrating Interpersonal and Group Dynamics-Elements of structure - functions of structure - determinants of structures - dys functionalities of structures.

**UNIT- IV: Organizational Behaviours** **09**

structure-technology environment-people relationships - principles underlying design of organizations; organizational culture - organizational politics - issues of power and authority - organizational communications - organizational change - integrating cases(s).

**UNIT -V : Case Studies** **09**

Case method and lectures should be supplemented with a variety of other methodologies such as feedback on questionnaires and tests, role plays - and behaviour simulation exercise.

	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>45</b>	<b>0</b>	<b>45</b>

**TEXT**

1. Newstrom John W. - Organizational Behaviour: Human Behaviour at Work (Tata Mc Graw Hill, 12 th Edition)
2. Luthans Fred - Organizational Behaviour (Tata Mc Graw Hill)

**REFERENCES**

1. Arnold, John, Robertson, Ivan T. and Cooper, Cary, L., "Work Psychology: Understanding Human Behaviour in the Workplace", MacMillan India Ltd., Delhi, 1996.
2. Dwivedi, R.S., "Human Relations and Organisational Behaviour: A Global Perspective", MacMuillan India Ltd., Delhi, 1995. "
3. Arnold, John, Robertson, Ivan T. and Cooper, Cary, L., "Work Psychology: Understanding Human Behaviour In the Workplace", MacMillan India Ltd., Delhi, 1996.
4. Dwivedi, R.S., "Human Relations and Organisational Behaviour: A Global Perspective", MacMillan India Ltd., Delhi, 1995.
5. French and Bell (4th ed), "Organization Development: Behavioral Science Interventions for Organization Improvement", Prentice Hall of India Pvt. Ltd., New Delhi, 1994.
6. Hellriegel, Slocum and Woodman, "Organizational Behaviour", West Publishing Co. USA, 1986.
7. Hersey and Blanchard (6th 00), "Management of Organizational Behaviour: Utilising Human Resources", Prentice Hall of India Pvt. Ltd., New Delhi, 1996.
8. Prasad, Kesho, "Organisational Development for Excellence", MacMillan India Ltd., New Delhi, 1996.
9. Robbins (4th 00), "Essentials of Organizational Behaviour", Prentice Hall of India Pvt. Ltd.New Delhi, 1995.

10. Schermerhorn, Hunt and Osborw, "Managing Organization Behaviour", John Willey & Sons, USA. 1982.

11. Weston, Mergers, "Restructuring and Corporate Control", Prentice Hall of India Pvt. Ltd. New Delhi, 1995.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	1	1
CO 2	2	1	1	1	1	1	1	1	1	1
CO 3	2	2	1	1	1	1	1	1	1	1
CO 4	2	2	1	1	1	1	1	1	1	1
CO 5	1	2	1	1	1	1	1	1	1	1
Total	9	8	5	5	5	5	5	5	5	5
Course	3	2	1	1	1	1	1	1	1	1

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA405- NETWORKS LAB

#### Course Outcomes

- CO1 P Guided Response *Manipulate* various operation to define FSK/MSK Modem
- CO2 P Set *Starts* and apply Sliding Window protocols
- CO3 P Guided Response *Develop* and *implement* Routing protocols
- CO4 P Guided Response *Develop* and *solve* problems in Application standards
- CO5 P Set *Build* SNMP

Course Code	Course Name	L	T	P	C
YCA405	Networks Lab	0	0	4	2
<b>C:P:A = 0:2:0</b>					
		L	T	P	H
		0	0	4	4
<b>UNIT -I : FSK/MSK Modem</b>					<b>12</b>

1. Study of the operation of FSK/MSK modem by varying the data rate and measuring error rate in random noise.	
<b>UNIT –II: Sliding Window Protocols</b>	<b>12</b>
2. Study of asynchronous and synchronous communication.	
3. Study of the performance of Stop and Wait and sliding window protocol	
<b>UNIT- III: Routing Protocols</b>	<b>12</b>
4. Study of different routing protocols.	
5. Study of Remote procedure call under Client-Server environment.	
<b>UNIT- IV: Application Standards</b>	<b>12</b>
6. Study of different application standards in the areas of a) file transfer access and management b) remote logging and virtual terminals c) E-mail systems d) Directory services	
<b>UNIT- V: SNMP</b>	<b>12</b>
7. Study of network performance and management using an SNMP. Compliance network managers.	
	<b>LECTURE    PRACTICAL    TOTAL</b>
	<b>0                  60                  60</b>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### YCA406- CASE TOOLS LAB

**Course Outcomes:**

CO1	P	Guided Response	<i>Manipulate</i> various methods to define CASE tools
CO2	P	Set	<i>Developing</i> Relational databases
CO3	P	Guided Response	<i>Describe</i> and <i>implement</i> various Application development tools
CO4	P	Set	<i>Describe</i> and <i>solve</i> problems in developing application software
CO5	P	Guided Response	<i>Developing</i> Management tools

Course Code	Course Name	L	T	P	C
YCA406	Case Tools Lab	0	0	4	2
<b>C:P:A = 0:2:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
					<b>60</b>

The lab sessions will have experiments on the following:

1. Use of diagramming tools for system analysis, such as Turbo analyst, for preparing Data Flow diagrams and E-R diagrams.
2. Use of tools for relational database design such as relational Designer.
3. Identify Use Cases and develop the Use Case model.
4. Identify the conceptual classes and develop a domain model with UML Class diagram
5. Draw relevant state charts and activity diagrams.
6. Use of tools such as Power Builder, Delphi, Magic etc. in developing application software including interactive data-entry screens,
7. Transaction processing
8. Report Generations, etc.
9. Use of tools for managing the process of software development such as Source Code Control System (SCCS).
10. Revision Control System (RCS), Make etc.

### References

Products manuals from concerned vendors

Keminghan, B.W., Pike, R., '6'fbe Unix Programming Environment", Prentice Hall of India,  
New Delhi, 1984.

	LECTURE	PRACTICAL	TOTAL
	0	60	60

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA501-ARTIFICIAL INTELLIGENCE AND APPLICATIONS

#### Course Outcomes:

- CO1 C Knowledge *Describe* various methods to define AI techniques
- CO2 C Understand *Understand* and apply set theory and Relations
- CO3 C Knowledge *Describe* and *apply* various counting and Predicate Logic
- CO4 C Understand *Describe* and *solve* problems in Probabilistic reasoning
- CO5 C Understand *Understand* Concept of learning the expert systems

COURSE CODE	COURSE NAME	L	T	P	C
YCA501	Artificial Intelligence and Applications	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		L	T	P	H
		3	0	0	3
<b>UNIT –I: AI Techniques</b>					<b>09</b>
AI techniques-search knowledge, abstraction- natural language processing- vision and speech processing- Games-theorem proving- robotics - expert systems.					
<b>UNIT -II:State Space Search</b>					<b>09</b>
State space search: Production systems- Search space control: Depth first, breadth first search, heuristic search - Hill climbing - best first search - branch and bound.					
<b>UNIT- III: Predicate Logic</b>					<b>09</b>

Minimax search: Alpha-Beta cut offs- Predicate Logic : Skolemizing queries - Unification.  
 Modus pone - Resolution - dependency directed backtracking

**UNIT- IV: Backtracking** **09**

Rule Based Systems-Forward reasoning-Conflict resolution-Backward reasoning-  
 Use of no backtrack-Structured Knowledge Representations- Semantic Net-slots, exceptions  
 and defaults Frames- Probabilistic reasoning-Use of certainty factors-Fuzzy logic.

**UNIT- V: Expert Systems** **09**

Concept of learning-learning automation-genetic algorithm- learning by induction-neural  
 netsback propagation-Need and justification for expert systems- Knowledge acquisition-  
 Case studies:MYCIN, RI.

	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>45</b>	<b>0</b>	<b>45</b>

**TEXT**

1. Stuart J.Russell and Peter Norvig., "Artificial Intelligence- A Modern Approach",  
 Pearson-3<sup>rd</sup> edition, 2010.

**REFERENCES**

1. Nilsson, N.J., "Principles of AP", Narosa Publishing House, 1990.
2. Patterson, D. W., "Introduction to AI and Expert Systems", Prentice Hall of India,  
 1992.
3. Peter Jackson, "Introduction to Expert Systems", Addison Wesley Publishing  
 Company, M.A., 1992
4. Rich, E., and Knight, K., "Artificial Intelligence", Tata McGraw Hill (2nd Edition), 1992.
5. Schalk off, R.J., "Artificial Intelligence • An Engineering Approach", McGraw Hill  
 International Edition, Singapore, 1992.
6. Sasikumar, M., Ramani, S., "Rule Based Expert System", Narosa Publishing  
 House,1994.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3

CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA502-GRAPHICS AND MULTIMEDIA

#### Course Outcomes:

- CO1 C Knowledge *Describe* various methods to define line-drawing algorithms  
CO2 C Understand *Understand* and apply 2d and 3d transformations  
CO3 C Knowledge *Describe* and *apply* various types multimedia applications  
CO4 C Understand *Describe* and *solve* problems in development tools  
CO5 C Understand *Understand* hypermedia

COURSE CODE	COURSE NAME	L	T	P	C
YCA502	Graphics and Multimedia	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT - I :OUTPUT PRIMITIVES</b>					<b>09</b>
Points and lines – Line-drawing algorithms – DDA algorithm – Bresenham’s line algorithm – Attributes of output primitives: Line attributes – Area-fill attributes – Character attributes – Bundled attributes					
<b>UNIT- II: 2D AND 3D TRANSFORMATIONS</b>					<b>09</b>
Two-dimensional Geometric transformations: Basic transformations – Matrix representations – Composite transformations – Three-Dimensional object representations – Three-Dimensional geometric and modeling transformations – Three-Dimensional viewing – Hidden surface elimination – Color models – Virtual reality – Animation					
<b>UNIT- III: MUTLIMEDIA</b>					<b>09</b>
Multimedia basics – Multimedia applications – Multimedia system architecture – Evolving technologies for multimedia – Defining objects for multimedia systems – Multimedia data interface standards – Multimedia databases					
<b>UNIT- IV: MULTIMEDIA</b>					<b>09</b>

Technology: Development Tools – Image – Audio – Video- Compression and decompression – Data and file format standards – Multimedia I/O technologies – Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval technologies

**UNIT- V: HYPERMEDIA** **09**

Multimedia authoring and user interface – Hypermedia messaging – Mobile messaging – Hypermedia message component – Creating hypermedia message – Integrated multimedia message standards – Integrated document management – Distributed multimedia systems

LECTURE	TUTORIAL	TOTAL
45	0	45

**TEXT**

1. Donald Hearn and M.Pauline Baker, Computer Graphics in C Version, Fifth Edition, Pearson Education, 2015.
2. Andleigh, P. K and Kiran Thakrar , Multimedia Systems and Design, PHI, 2003.
3. Judith Jeffcoate , Multimedia in Practice: Technology and Practice., Pearson Education, 2014

**REFERENCES**

1. William M. Neuman, Robert R. Sprout, Principles of interactive Computer Graphics, McGraw Hill International Edition.
2. Buford J. F Koegel, Multimedia Systems, Twelfth Indian Reprint, Pearson Education

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	3	3	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	3	2	2	2	1	2	2	3	3
CO 4	3	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	15	14	11	11	11	5	10	10	13	13
Course	3	3	3	3	3	1	1	1	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation



## YCA503- OPTIMIZATION TECHNIQUES

### Course Outcomes:

CO1	C	Knowledge	<i>Describe</i> various methods to define simplex method
CO2	C	Understand	<i>Understand</i> and apply branch and bound method.
CO3	C	Knowledge	<i>Describe</i> and <i>apply</i> various queuing theory
CO4	C	Understand	<i>Describe</i> and <i>solve</i> problems in inventory theory
CO5	C	Understand	<i>Understand</i> PERT and CPMpath.

COURSE CODE	COURSE NAME	L	T	P	C
YCA503	<b>Optimization Techniques Linear Programming</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C:P:A = 3:0:0</b>					
		L	T	P	H
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT- I: Introduction to Optimization Techniques</b>					<b>09</b>
Graphical method for two dimensional problems - Central problem of linear programming various definitions - statements of basic theorems and properties - Phase I and Phase II of the simplex method - revised simplex method - primal and dual - dual simplex method.					
<b>UNIT- II: Integer Programming</b>					<b>09</b>
Sensitivity analysis transportation problem and its solution - assignment problem and its solution by Hungarian method- Gomorra cutting plane methods - Branch and Bound method					
<b>UNIT- III: Queuing Theory</b>					<b>09</b>
Characteristics of queuing systems - steady state Mimi, MIMit/K and MIMIC queuing models- Replacement of items that deteriorate - Replacement of items that fail Group replacement and individual replacement.					
<b>UNIT- IV: Inventory Theory</b>					<b>09</b>
Costs involved in inventory problems - single item deterministic models-economic lot size models without shortages and with shortages having production rate infinite and finite.					
<b>UNIT- V: PERT and CPM</b>					<b>09</b>
Arrow networks - time estimates- earliest expected time, latest allowable occurrence time and slack - critical path - probability of meeting scheduled date of completion of project- calculations on CPM network - various floats for activities - critical path - updating project					

- operation time cost trade off curve - project time cost trade off curve - selection of schedule based on cost analysis.

	LECTURE	TUTORIAL	TOTAL
	45	0	45

**TEXT**

1. Hamdy A.TAHA., "Operations research- An Introduction", 8<sup>th</sup> edition, Pearson Education, Inc, 2007.

**REFERENCES**

1. Karnbo, N.S., "Mathematical Programming Techniques", McGraw Hill, New York. 1985.
2. Kanti Swarup, Gupta, P.K., and Man Mohan, "Operations Research", Sultan Chand & Sons-New Delhi. 1990.
3. Mital K. V., "Optimization Methods In Operations Research and System Analysis", New Age International (P) Ltd., New Delhi, 1992.
4. Saffer, L.R., Fitter J.B., and Meyer W.L., "The Critical Path Method". McGraw Hill. New York. 1990.
5. Taha, H.A., "Operations research- An Introduction", McMillan Publishing co .• New York, 1986.
6. Gillet, B.E., "Introduction to Operations Research : A Computer Oriented Algorithmic Approach". Tata McGraw Hill, New York, 1990.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	2	2	2	2	2	1	1	1	2	2
CO 5	3	2	2	2	2	1	1	1	2	2
Total	13	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

## YCA504- ARTIFICIAL INTELLIGENCE AND APPLICATIONS LAB

### Course Outcomes:

- CO1 P Guided Response *Manipulate* various methods to define AI techniques
- CO2 P Set *Starts* and apply set theory and Relations
- CO3 P Guided Response *Develop* and *implement* various counting and Predicate Logic
- CO4 P Guided Response *Develop* and *solve* problems in Probabilistic reasoning
- CO5 P Set *Build* Concept of learning the expert systems

COURSE CODE	COURSE NAME	L	T	P	C
YCA504	Artificial Intelligence and Applications Lab	0	0	3	2
<b>C:P:A = 0:2:0</b>					
		L	T	P	H
		0	0	0	3
					45

1. Write a program to implement simple Chatbot using NLP concept of AI.
2. Write a program to implement Breadth first search traversal Algorithm with AI techniques.
3. Write a program to implement Depth first search traversal Algorithm using AI techniques.
4. Write a program to implement Tower of Hanoi Problem using AI techniques.
5. Write a program to implement Hung man game with AI techniques.
6. Write a program to implement Tic-Tac-Toe game with AI techniques.
7. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets in machine learning.
8. Write a program to implement K nearest Neighbour algorithm to classify the iris data set, print both correct and wrong predictions using Machine Learning Techniques.
9. Case Study in NLP - Text classification, parts of speech tagging and stemming from sentences.
10. Case Study in DCNN - GoogLeNet and AlexNet

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2

CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA505-OPTIMIZATION TECHNIQUES LAB

#### Course Outcomes:

- CO1 P Guided Response *Manipulate* various methods to define simplex method
- CO2 P Set *Starts* and apply branch and bound method.
- CO3 P Guided Response *Develop* and *implement* various queuing theory
- CO4 P Guided Response *Develop* and *solve* problems in inventory theory

COURSE CODE	COURSE NAME	L	T	P	C
YCA505	Optimization Techniques Lab	0	0	3	2
<b>C:P:A = 0:2:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>
					<b>45</b>

To develop computer programs for the following and to test with suitable numerical examples

1. Graphical method to solve two dimensional Linear Programming Problem.
2. Revised Simplex method to solve n-dimensional Linear Programming Problem
3. Dual Simplex method to solve n-dimensional Linear Programming Problem.
4. Solution of Transportation problem.
5. Gomory cutting plane methods for Integer Programming Problems
6. Branch and Bound method to solve Integer Programming Problem.
7. M/M/1/N AND M/M/C queuing problems.

8. Single item deterministic inventory model problems with/without shortage and finite/infinite production rate.
9. To draw the PERT/CPM networks.
10. Calculations of PERT analysis
11. Calculation of CPM analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

<b>COURSECODE</b>	<b>COURSE NAME</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>YCA506</b>	<b>Industrials Lectures</b>	0	0	2	2
<b>C:P:A = 0:2:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		0	0	2	2

CO1	P	Guided Response	Identifying the Recent Technologies
CO2	P	Guided Response	Preparing the content/Arranging the Seminar
CO3	P	Guided Response	Attending the Lectures
CO4	P	Guided Response	Implementing the Lectures
CO5	P	Guided Response	Answer the Question

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
<b>CO 1</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 2</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 3</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 4</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 5</b>	2	2	2	2	2	2	2	2	3	3
<b>Total</b>	10	10	10	10	10	10	10	10	15	15
<b>Course</b>	3	2	2	2	2	2	2	2	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

<b>COURSECODE</b>	<b>COURSE NAME</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>YCA507</b>	<b>Seminar</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>
<b>C:P:A = 0:2:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>

- CO1 P Guided Response Identifying the Topic
- CO2 P Guided Response Preparing the content/Arranging the Seminar
- CO3 P Guided Response Presenting the content
- CO4 P Guided Response Addressing the Audience
- CO5 P Guided Response Answer the Question

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
<b>CO 1</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 2</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 3</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 4</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 5</b>	2	2	2	2	2	2	2	2	3	3
<b>Total</b>	10	10	10	10	10	10	10	10	15	15
<b>Course</b>	3	2	2	2	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

COURSECODE	COURSE NAME	L	T	P	C
<b>YCA508</b>	<b>Project Work</b>	0	0	6	2
<b>C:P:A = 0:2:0</b>					
		L	T	P	H
		0	0	6	6

CO1	P	Guided Response	Practice the Requirements Analysis
CO2	P	Guided Response	Create the Design for their project
CO3	P	Guided Response	Create the Coding
CO4	P	Guided Response	Plan for Testing
CO5	P	Guided Response	Solve the Conclusion

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
<b>CO 1</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 2</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 3</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 4</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 5</b>	2	2	2	2	2	2	2	2	3	3
<b>Total</b>	10	10	10	10	10	10	10	10	15	15
<b>Course</b>	3	2	2	2	2	2	2	2	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

<b>COURSECODE</b>	<b>COURSE NAME</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>YCA601</b>	<b>Seminar</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>
<b>C:P:A = 0:3:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>



				0	0	3	3
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- CO1 P Guided Response Identifying the Topic
- CO2 P Guided Response Preparing the content/Arranging the Seminar
- CO3 P Guided Response Presenting the content
- CO4 P Guided Response Addressing the Audience
- CO5 P Guided Response Answer the Question

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
<b>CO 1</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 2</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 3</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 4</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 5</b>	2	2	2	2	2	2	2	2	3	3
<b>Total</b>	10	10	10	10	10	10	10	10	15	15
<b>Course</b>	3	2	2	2	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

COURSECODE	COURSE NAME	L	T	P	C
YCA602	Project Work	0	0	6	12

<b>C:P:A = 0:3:2</b>					
				<b>L</b>	<b>T</b>
				<b>P</b>	<b>H</b>
				0	0
				6	6

- CO1 P Guided Response Practice the Requirements Analysis
- CO2 P Guided Response Create the Design for their project
- CO3 P Guided Response Create the Coding
- CO4 P Guided Response Plan for Testing
- CO5 P Guided Response Solve the Conclusion

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
<b>CO 1</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 2</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 3</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 4</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 5</b>	2	2	2	2	2	2	2	2	3	3
<b>Total</b>	10	10	10	10	10	10	10	10	15	15
<b>Course</b>	3	2	2	2	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

## YCAEE1-PROGRAMMING LANGUAGES AND PARADIGMS

### Course Outcomes:

Course Outcomes		Domain	Level
CO1	<i>Explain</i> the concept of programming languages and paradigms	Cognitive	Understand
CO2	<i>Understand</i> the concept of Expression Control	Cognitive	Understand
CO3	<i>Describe</i> various Procedural languages	Cognitive	Understand

CO4	<i>Understand</i> the Output-based languages	Cognitive	Understand
CO5	<i>Understand</i> theFunctional languages	Cognitive	Understand

Course Code	Course Name	L	T	P	C
YCAEE1	<b>Programming Languages and Paradigms</b>	4	0	0	4
<b>C:P:A = 4:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>UNIT- I: Introduction</b>					<b>12</b>
Concept of programming languages; Need and Characteristics to study programming languages; Programming language paradigms: Imperative, Object Oriented, Functional, Logic, Event Driven and Concurrent Programming; Attributes of a good language; Effects of environments; syntactic elements; Language design issues; Virtual computers and binding times; Language Translation issues; Stages in translation; Data Types and objects: properties of Types and objects, Elementary data types, structured data types, Type conversion; Virtual computers and binding times.					
<b>UNIT- II: Expression Control</b>					<b>12</b>
Expression Control ; Arithmetic expressions; non arithmetic expressions; Control between Statements; Sub program control: Sequence control, data control and stored data.					
<b>UNIT- III: Procedural languages</b>					<b>12</b>
Concept of Procedural languages; Data objects; sequence control; subprograms and storage managements; Exceptions and exception handling.					
<b>UNIT- IV: Output-based languages</b>					<b>12</b>
Concept of Output-based languages; Data objects; sequence control; subprograms and storage management, abstraction and encapsulation.					
<b>UNIT –V: Functional languages</b>					<b>12</b>
Functional languages: Data objects, sequence control, subprograms and storage management Logic programming languages: Data objects, sequence control, subprograms and storage management.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>60</b>	<b>-</b>	<b>60</b>	

**TEXT Books**

1. Pratt T.W., Zelkowitz “Programming Languages: Design and Implementation” PHI, 2002, 3rd Edition.ISBN-81-203-1038-1
2. RoostaSeyed, “Foundations of Programming Languages Design &Implementation”, 3rd Edition, Cenage learning. ISBN-13:978-81-315-1062-9.

**REFERENCES**

1. Sebesta R. W., “Concepts of programming languages”, Pearson Education 2001, 4th edition.ISBN-81-317-0837-3.
2. Sethi Ravi, “Programming Languages: Concepts and Constructs” Pearson Education, ISBN: 9788177584226
3. Herbert Schildt “The Complete Reference Java2”, 5th edition, Tata McGraw Hill, ISBN13: 978-0-07-049543-2.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	2	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	13	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1– Low relation

**YCAEE2-VISUAL PROGRAMMING****Course Outcomes:**

Course Outcomes		Domain	Level
CO1	<i>Explain</i> the concept of Visual programming	Cognitive	Understand
CO2	<i>Understand</i> the concept of Structures and Programming Techniques	Cognitive	Understand
CO3	<i>Understand</i> the concept Object-Oriented programming	Cognitive	Understand
CO4	<i>Understand</i> the Object-oriented development tools	Cognitive	Understand
CO5	<i>Understand</i> the programming techniques	Cognitive	Understand

Course Code	Course Name	L	T	P	C
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<b>YCAEE2</b>	<b>Visual Programming</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>C:P:A = 4:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>UNIT –I: Introduction</b>					<b>12</b>
Visual programming principles – GUI Design - User-centered Design - Navigation Accessibility - Structure – Elements- Visual hierarchy – Typography – Graphics – Animation – Creative design.					
C and C++ foundations Data, controls, writing and using functions. Arrays, pointers.					
<b>UNIT- II: Structures and Programming Techniques</b>					<b>12</b>
I/O structures, unions and miscellany. Advanced C and C++ programming techniques.					
<b>UNIT- III: Object-Oriented programming</b>					<b>12</b>
Introduction to Object-Oriented programming, C++ classes. I/O. Working in object-oriented environment.					
<b>UNIT- IV: Object-Oriented Development</b>					<b>12</b>
Generic concepts and tools for windows. Procedure oriented development - 16 bit applications. Object-oriented development - Foundation class library.					
<b>UNIT- V: Programming Techniques</b>					<b>12</b>
Windows 95 and Windows NT programming techniques.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>60</b>	<b>-</b>	<b>60</b>	
<b>TEXT Books</b>					
1. Murray, et.al "The Visual C++ Handbook", 2nd edition. Osborne McGraw Hill. New York.1996.					
<b>REFERENCES</b>					
2.Wilbert O. Galitz, “The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques”, Wiley Desktop Editions, 2007					
3.SandeepChatterjee, Janes Webber, “Developing Enterprise Web Services: An Architect’s Guide”, Pearson Education, 2005					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3

CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### YCAEE3-COMPILER DESIGN

#### Course Outcomes:

Course Outcomes		Domain	Level
CO1	<i>Explain</i> the concept of Compiler designing	Cognitive	Understand
CO2	<i>Understand</i> the concept of parser Theory	Cognitive	Understand
CO3	<i>Understand</i> the conceptsyntax analysis	Cognitive	Understand
CO4	<i>Understand</i> the handling techniques	Cognitive	Understand
CO5	<i>Understand</i> thecode generation	Cognitive	Understand

Course Code	Course Name	L	T	P	C
YCAEE3	Compiler Design	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3
<b>UNIT- I : Introduction</b>					<b>9</b>
Classification of grammars. Context free grammars. Deterministic finite state automata (DFA) Non-DFA.					
<b>UNIT- II: Parsing Theory- Syntax Analyzer</b>					<b>9</b>
Scanners. Top down parsing, LL grammars. Bottom up parsing. Polish expressions Operator precedence grammar. IR grammars. comparison of parsing methods. Error handling.					
<b>UNIT- III: Runtime Environment</b>					<b>9</b>
Symbol table handling techniques. Organization for non-block and block structured languages. Run time storage administration. Static and dynamic allocation.					
<b>UNIT- IV: Syntax Analysis</b>					<b>9</b>

Intermediate forms of source program. Polish N-tuple and syntax trees. Semantic analysis and code generation.

**UNIT- V: Code Optimization and Code Generation** **9**

Code optimization. Folding, redundant sub-expression evaluation. Optimization within iterative loops.

	LECTURE	TUTORIAL	TOTAL
	45	-	45

**TEXT Books**

Murray, et.al "The Visual C++ Handbook", 2nd edition. Osborne McGraw Hill. New York. 1996.

**REFERENCES**

1. Tremblay, et. al, "The Theory and Practice of Compiler Writing". McGraw Hill, New York,
2. Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers Elsevier Science, 2004.
3. Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

## YCAEE4- ADVANCED UNIX PROGRAMMING

### Course Outcomes:

- CO1 C Knowledge *Describe* various methods to define Advanced unix programming
- CO2 C Understand *Understand* and apply processes and System calls
- CO3 C Knowledge *Describe* and *apply* various Multiplexing
- CO4 C Understand *Describe* and *solve* problems in IPC
- CO5 C Understand *Understand* Advanced socket programming

Course Code	Course Name	L	T	P	C
YCAEE4	Advanced Unix Programming	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT –I: Advanced Unix Programming</b>					<b>09</b>
Organization of Unix - User interface. Programmer interface - The environment of Unix process System calls.					
<b>UNIT- II: Processes and System calls</b>					<b>09</b>
Process control - File related system calls - Process related system calls - Signals Programming using system calls.					
<b>UNIT- III: Multiplexing</b>					<b>09</b>
Advanced I/O multiplexing - Memory mapped I/O.					
<b>UNIT- IV: Interprocess Communications</b>					<b>09</b>
Interprocess communication: Pipes - shared memory - semaphores - messages.					
<b>UNIT- V : Advanced Socket Programming and IPC</b>					<b>09</b>
Advanced interprocess communications - Streams - Pipes - Open server.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	



	<b>45</b>	<b>0</b>	<b>45</b>
<b>TEXT</b>			
I.Steven, R., "Unix Network Programming", Prentice Hall of India, New Delhi, 1994.			
<b>REFERENCES</b>			
I.Stevens. W.R .. "Advanced Programming in the Unix environment". Addison Wesley. Reading. M.A .. 1992.			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### YCAEE5 - DISTRIBUTED DATABASE MANAGEMENT

#### Course Outcomes:

- CO1 C Knowledge    *Describe* various methods to define levels of distributed database design
- CO2 C Understand    *Understand* and apply time based and quorum based protocols
- CO3 C Knowledge    *Describe* and *apply* various types of protocols
- CO4 C Understand    *Describe* and *solve* problems in distributed data dictionary management
- CO5 C Understand    *Understand* SQL server

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE5	Distributed Database Management	3	0	0	3

<b>C:P:A = 3:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT- I :Distributed Database Design</b>					<b>09</b>
Distributed DBMS features and needs - Reference architecture- Levels of distribution transparency, replication- Distributed database design - fragmentation, allocation criteria- Storage mechanisms.					
<b>UNIT- II:Global Query Optimization</b>					<b>09</b>
Translation of global queries /Global query optimization- Query execution and access plan- Concurrency control - 2 phase locks- Distributed deadlocks- Time based and quorum based protocols- Comparison					
<b>UNIT- III: Types of Protocols</b>					<b>09</b>
Reliability - non-blocking commitment protocols-Partitioned networks-Checkpoints and cold starts-Management of distributed transactions - 2 phase unit protocols- Architectural aspects.					
<b>UNIT- IV: Distributed Data Dictionary Management</b>					<b>09</b>
Node and link failure recoveries-Distributed data dictionary management- Distributed database administration.-Heterogeneous databases-federated database, reference architecture, loosely and tightly coupled.					
<b>UNIT- V: SQL Server</b>					<b>09</b>
Alternative architectures- Development tasks, Operation - global task management-Client server databases-SQL server, open database connectivity- Constructing an application.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>45</b>	<b>0</b>	<b>45</b>	
<b>TEXT</b>					
1. Elim asri.navathe- "Fundamentals of Database Management Systems"- 6 <sup>th</sup> edition ,Addison Welsey.					
2. M.Tamer Ozsu,Patrick valduriez "principles of distributed database systems "- 3 <sup>rd</sup> edition ,Springer science +Business Media ,LLC 2011.					
<b>REFERENCES</b>					
1. Ceri, S .. Pe1agatti. G., "Distributed Databases: Principles and System', McGraw Hill. New York, 1985.					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	3	2	2	2	1	2	2	3	3
CO 4	3	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	15	14	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCAEE6 – IMAGE PROCESSING

#### Course Outcomes:

	Domain	Level	
CO 1	Cognitive	Understand	<i>Describe</i> the basics of digital image fundamentals.
CO 2	Cognitive	Knowledge	<i>Understand</i> the classifications of Image Processing techniques.
CO 3	Cognitive	Knowledge Apply	<i>Describe</i> and <i>apply</i> various types of feature extraction techniques applicable for image vision.
CO 4	Cognitive	Understand Apply	<i>Describe</i> and <i>solve</i> problems in encoding images based on the concept of Fourier transforms.
CO 5	Cognitive	Knowledge	<i>Define</i> the concept of filtering and Restorations.

COURSE CODE	COURSE NAME	L	T	P	C
Course code	Course name	3	0	0	3
YCAEE6	Image Processing				
C:P:A = 3:0:0		L	T	P	H
		3	0	0	3
<b>UNIT –I: Digital Image Fundamentals</b>					<b>9</b>

Image digital Representation. Elements of visual perception .Sampling and quantization. Image processing system elements. Fourier transforms. Extension to 2- D, OCR, Walsh, Hadamard transforms.			
<b>UNIT- II: Image Transformation and segmentation</b>			<b>9</b>
Enhancement and segmentation: Histogram modification. Smoothing, sharpening.			
<b>UNIT – III: Feature Extraction</b>			<b>9</b>
Thresholding. Edge Detection. Segmentation. Point and region dependent techniques.			
<b>UNIT -IV : Image Encoding</b>			<b>9</b>
Image encoding: Fidelity criteria. Transform compression. KL, Fourier, DCT. Spatial compression, Run length coding. Huffman and contour coding.			
<b>UNIT- V : Image Restoration</b>			<b>9</b>
Restoration: Models. Inverse filtering. Least squares filtering. Recursive filtering.			
	<b>LECTURE</b>	<b>TUTORIA L</b>	<b>TOTAL</b>
	<b>45</b>	<b>0</b>	<b>45</b>
<b>TEXT</b>			
1. Mark Nixon, et.a l, “Feature Extraction & Image processing for Computer vision” 3 rd Edition, 2012.			
<b>REFERENCES</b>			
1. Gonslaez, Richard E. Woodset.a1, "Digital Image Processing", Addison Wesley, Reading, M.A., 1990.			

	PO1	PO2	PO3	PO 4	PO 5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2

Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCAEE7 – PARALLEL PROGRAMMING

#### Course Outcomes:

	Domain	Level	
CO1	Cognitive	Understand	<i>Describe</i> the basics of Parallel Programming techniques.
CO2	Cognitive	Knowledge	<i>Understand</i> the concept of Data dependency
CO3	Cognitive	Knowledge	<i>Describe</i> and <i>apply</i> various types of Performance analysis
CO4	Cognitive	Understand	<i>Describe</i> and <i>solve</i> problems in Parallel Programming
CO5	Cognitive	Understand	<i>Understand the</i> Methods for Applying in Programming parallel.

Course code	Course name	L	T	P	C
YCAEE7	Parallel Programming	3	0	0	3
		L	T	P	H
<b>C:P:A = 3:0:0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT- I: Parallel Programming- Introduction</b>					<b>9</b>
Processes and processors. Shared Memory. Fork. Join constructs. Basic parallel programming techniques-loop splitting, spin locks, contention barriers and row conditions.					
<b>UNIT- II: Data dependency and Scheduling</b>					<b>9</b>
Variations in splitting, self and indirect scheduling. Data dependency-Forward and Backward. Block scheduling.					
<b>UNIT- III: Performance Analysis</b>					<b>9</b>
Linear recurrence relations. Backward dependency. Performance tuning overhead with number of processes, effective use of cache.					

<b>UNIT- IV: Parallel Programming – Problems</b>			<b>9</b>
Parallel programming examples: Average, mean squared deviation, curve fitting, numerical integration, travelling salesman problem, Gaussian elimination. Discrete event time simulation.			
<b>UNIT- V: Parallel Programming Methods</b>			<b>9</b>
Parallel Programming constructs in HPF, Fortran 95. Parallel programming under Unix.			
	<b>LECTURE</b>	<b>TUTORIA L</b>	<b>TOTAL</b>
	<b>45</b>	<b>0</b>	<b>45</b>
<b>TEXT</b>			
1.Roosta, Seyed H, " Parallel Processing and Parallel Algorithms", 2016.			
<b>REFERENCES</b>			
1.Brawer, S., "Introduction to parallel programming", Academic Press, New York, 2005.			

	PO1	PO2	PO3	PO 4	PO 5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	2	2	2	1	1	2	2
CO 2	3	3	3	2	2	2	1	1	2	2
CO 3	3	3	3	2	2	2	1	1	2	2
CO 4	3	3	3	2	2	2	1	1	2	2
CO 5	2	2	2	2	2	2	1	1	2	2
Total	14	14	14	10	10	10	5	5	10	10
Course	3	3	3	2	2	2	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

## **YCAEE8    SYSTEM ANALYSIS AND SIMULATION**

### **Course Outcomes:**

- |     |   |            |   |
|-----|---|------------|---|
| CO1 | C | Knowledge  | <i>Define</i> Role of modeling                      |
| CO2 | C | Understand | <i>Describe</i> Generation of Pseudo-Random Numbers |
| CO3 | C | Knowledge  | <i>Outline the</i> simulating queuing systems       |
| CO4 | C | Knowledge  | <i>Describe</i> Simulation of Systems               |

CO5 C Understand *Understand* Cases on Simulation

SUBCODE	SUB NAME	L	T	P	C
YCAEE8	System Analysis and Simulation	4	0	0	4
C:P:A =4:0:0					
		L	T	P	H
		4	0	0	4
<b>UNIT- I : (Systems Analysis)</b>					<b>12</b>
Role of Modeling in Systems Analysis: Computer Simulation of Stochastic Systems';					
<b>UNIT- II: (Simulation of Queuing Systems)</b>					<b>12</b>
Generation of Pseudo-Random Numbers- and Stochastic Variates using the computer; - Simulation of Queuing Systems					
<b>UNIT -III: (Simulation Languages)</b>					<b>12</b>
Using special purpose languages for simulating queuing systems- GPSS and/or SLAM- System Dynamics					
<b>UNIT- IV: (System Dynamics with Dynamo)</b>					<b>12</b>
Simulation of Systems with Feedback; using DYNAMO in System Dynamics;					
<b>UNIT -V :(Simulation on Business)</b>					<b>12</b>
Cases on Simulation in Production-Finance, Marketing, and Corporate Planning; Project Work					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>60</b>	<b>0</b>	<b>60</b>	
<b>TEXT</b>					
1. Kamal, Raj, Embedded Systems: Architecture, Programming & Design, Tata McGraw Hill, 2ndEd.,2008					
2.Jerry Banks, John S. Carson, Barry L. Nelson, David M. Nicol “Discrete – Event system simulation”, Pearson education.					
<b>REFERENCES</b>					
1 Banks, J., Catson, S., Nelson, B.L., "Discrete-Event System Simulation", (2nd Edition). Prentice Hall of India, N. Delhi, 1996.					
2. Deo, N., "System Simulation with Digital Computers". Prentice Hall of India, 1979.					
Law, A.M., and Kelton, W.D., "Simulation Modelling and Analysis", (2nd Edition). McGraw Hill, N. Y, 1991.					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCAEE9 MACHINE LEARNING

#### Course Outcomes:

CO1	C	Understand	<b>Understand</b> the Fundamentals of Machine Learning
CO2	C	Understand	<i>Understand</i> comparison between Machine and Deep Learning
CO3	C	Understand	<i>Understand</i> concept of supervised and unsupervised machine learning
CO4	C	Understand	<i>Understand</i> Graphical models
CO5	C	Understand	<b>Understand</b> Regression

COURSE CODE	COURSE NAME	L	T	P	C
	<b>MACHINE LEARNING</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>C:P:A = 4:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>UNIT- I: INTRODUCTION TO MACHINE LEARNING</b>					<b>12</b>
Fundamentals of Machine Learning - Supervised and unsupervised learning-Reinforcement Learning-Batch and Online Learning-Instance-Based Versus Model-Based Learning- Challenges of Machine Learning-Training Data-Testing and validating-Applications of Machine learning.					
<b>UNIT- II: MACHINE LEARNING VS DEEP LEARNING</b>					<b>12</b>



Machine Learning Process – Deep Learning Process – Comparison of Machine Learning and Deep Learning – Usage: Machine Learning – Deep Learning – Types of Deep Learning Process – Reinforcement Learning – Deep learning application – Limitations of Deep Learning

**UNIT- III: SUPERVISED AND UNSUPERVISED MACHINE LEARNING 12**

Supervised learning: How it works? – Types of Learning Algorithm – Challenges in Supervised Learning - Generative vs discriminative learning, Gaussian mixture models, Decision Tree learning, Neural Networks, Support vector machines, Instance based learning, Ensemble learning. – Advantages of supervised Learning – Dis advantage – Unsupervised Learning: – Importance of Un supervised Learning – Types - Discovering clusters, Discovering latent factors, Discovering graph structure, Dimensionality reduction, – Applications.

**UNIT- IV: GRAPHICAL MODELS: 12**

Bayesian Learning , Markov random Fields, Hidden Markov model, conditional random fields.

**UNIT- V: REGRESSION 12**

Regression: Linear regression, logistic regression, other types of regression, Over fitting, Model selection.

	LECTURE	TUTORIAL	TOTAL
	60	0	60

**TEXT**

- 1 Ethem Alpaydin, “Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series”, 3rd Edition, MIT Press, 2014
- 2 Kevin P. Murphy, Machine Learning A probabilistic Perspective, MIT press, 2012.
- 3 Christopher Bishop. Pattern Recognition and Machine Learning., Springer, 2006.

**REFERENCES**

1. Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, 1st Edition, Wiley, 2014
2. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, 2nd Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 8	PSO 9
CO 1	3	3	2	2	2	2	1	2	2

CO 2	3	3	2	2	2	2	1	2	2
CO 3	3	3	2	2	2	2	1	2	2
CO 4	3	3	2	2	2	2	1	2	2
CO 5	3	2	2	2	2	2	1	2	2
Total	15	14	10	10	10	10	5	10	10
Course	3	3	2	2	2	2	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### YCABM1 -MANAGERIAL ECONOMICS

#### Course Outcomes:

- CO1 C Knowledge    *Describe* Nature and scope of managerial economics  
CO2 C Understand    *Define* and measure elasticity.  
CO3 C Knowledge    *Describe* Product and cost analysis  
CO4 C knowledge    *Describe* Production function  
CO5 C Understand    *Understand* product and profits

COURSECODE	COURSENAME	L	T	P	C
YCABM1	Managerial Economics	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3
<b>UNIT- I: (Features of managerial economics)</b>					<b>9</b>
Nature and scope of managerial economics. Objectives of the firm .Managerial and behavioral theories of the firm.					
<b>UNIT- II: (Concepts of demand forecasting)</b>					<b>9</b>
Concepts of opportunity cost- incremental - time perspective. Principles of discounting and equimargins - Demand analysis - purposes and concepts - Elasticity of demand - Methods of demand forecasting.					
<b>UNIT – III: (Product and cost analysis)</b>					<b>9</b>
Product and cost analysis- short run and long run average cost curves - Law of supply - Economies and diseconomies of scale.Law of variable proportions					
<b>UNIT- IV : (Product and price)</b>					<b>9</b>

Production function - single output isoquants- Pricing: Prescriptive approach.- Price determination under perfect competition.

**UNIT -V : (Profits and Break-even analysis)**

**9**

Monopoly, oligopoly and monopolistic competition - Full cost pricing- product line pricing-Pricing strategies - Profits: Nature and. measurement policy. Break-even analysis.Case study.

LECTURE	TUTORIAL	TOTAL
45	0	45

**TEXT**

1. Managerial Economics- Theory and Applications, Dr. D.M Mithani, Himalaya Publications
2. Managerial Economics, D.N Dwivedi, 6th ed., Vikas Publication.
3. Managerial Economics, H. L Ahuja, S. Chand, 2011
4. Indian Economy, K P M Sundharam and Dutt, 64th Edition, S Chand Publication.
5. Business Environment Text and Cases by Justin Paul, 3rd Edition, McGraw-Hill Companies.

**REFERENCES**

- 1.Dean. J .."Management Economics".Prentice Hall of India, New Delhi. 1982.
- 2.Mote.V.L..et al. "Managerial Economics: Concepts and Cases". Tata McGraw Hill.New Delhi, 1980.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	2	1	1	1	2	2
CO 2	2	1	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	1	2	1	1	2	1	1	1	2	2
Total	09	08	05	05	10	5	5	5	10	10
Course	03	02	01	01	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

## YCABM2- CORPORATE PLANNING

### Course Outcomes:

- CO1 C Knowledge *Describe* various methods to define *Corporate Planning and Budgeting*
- CO2 C Understand *Understand* and apply set *Social Responsibilities*
- CO3 C Knowledge *Describe* and *apply* various *Professionalism*
- CO4 C Understand *Describe* and *solve* problems in *Mission and Purpose*
- CO5 C Understand *Understand* Concept of learning the *Organisation Appraisal*

COURSE CODE	COURSE NAME	L	T	P	C
YCABM2	Corporate Planning	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3
<b>UNIT- I: Corporate Planning and Budgeting</b>					<b>09</b>
Significance of Planning: Types-Needs-Requisites-Corporate planning: system approach- Role of the planner-Corporate planning and budgeting.					
<b>UNIT- II: Social Responsibilities</b>					<b>09</b>
Social responsibilities: Scope, contents, cooperation and society, consumers, corporation and democracy, community-government.					
<b>UNIT- III: Professionalism</b>					<b>09</b>
Social responsibility-versus profitability-productivity-growth-Professionalism as a means of social behaviour.					
<b>UNIT- IV: Mission and Purpose</b>					<b>09</b>
Mission and purpose: Business definitions - objectives and goals-Environment appraisal: Concepts, components-Scanning and appraising the environment.					
<b>UNIT- V: Organisation Appraisal</b>					<b>09</b>
Organization appraisal: Dynamics-capability factors- Considerations- Methods and techniques- Structuring- Planning gaps: Gap analysis- Manager audit: Significance of gaps.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>45</b>	<b>0</b>	<b>45</b>	
<b>TEXT</b>					
1.Kazni. A .. "Business Policy". Tata McGraw Hill. New Delhi, 1992.					

2.Johnson. G .. etal. 3rd edition. "Exploring corporate Strategy", Prentice Hall of India, New Delhi. 1994.

### REFERENCES

1.CA.(Dr.)K.M. Bansal "Corporate Accounting". Taxmann.S. University of Delhi.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	1	1	2	1	1	1	2	2
CO 2	2	1	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	1	1	1	2	1	1	1	2	2
Total	10	8	5	5	10	5	5	5	10	10
Course	2	2	1	1	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCABM3- FOUNDATIONS OF DECISION PROCESSES

#### Course Outcomes:

- CO1 C Knowledge *Describe* various methods to define role of decision making  
 CO2 C Understand *Understand* and apply game theory and competitive strategies  
 CO3 C Knowledge *Describe* and *apply* various queuing and inventory models  
 CO4 C Understand *Describe* and *solve* problems in Finance.  
 CO5 C Understand *Understand*Systematic problem analysis

Course code	Course name	L	T	P	C
YCABM3	Foundations of Decision Processes	4	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		4	0	0	4
<b>UNIT- I:-Decision Making</b>					<b>12</b>
Role of decision making in management-Framework-Criteria under conditions of certainty-risk and uncertainty-Baytes theorem-Sequential decision making decision tree analysis.					

<b>UNIT –II:Competitive Strategies</b>	<b>12</b>
Theory of utility- Utility function curve- Competitive strategies, game theory- Queuing model-Single channel, single phase waiting line model with Poisson.	
<b>UNIT- III: Simulation</b>	<b>12</b>
Distributed arrival rates and exponentially distributed service times-Markov models-Simulation: Monte Carlo- Application to queuing and inventory models-Applications in functional areas of marketing, production.	
<b>UNIT- IV: Finance</b>	<b>12</b>
Finance- Behavioral aspects in decision making-open and closed models of decisions.	
<b>UNIT –V: Systematic Problem Analysis</b>	<b>12</b>
Systematic problem analysis and decision making- Decision making in functional areas - case studies.	
	<b>LECTURE    TUTORIAL    TOTAL</b>
	<b>60                    0                    60</b>
<b>TEXT</b>	
1. Gregory, G. "Decision analysis", Pitman, London, .1988.	
2. Johnson. R.D .. et. al. "Quantitative Techniques filr Business Decisions". Prentice Hall. N.J ..1977.	
<b>REFERENCES</b>	
1. Ronald A. Howard, Ali E. Abbas, “ <i>Foundations of Decision Analysis</i> ”.Pearson,. 2016.	
2. David C.skinner.,”Introduction to decision analysis”, 3 <sup>rd</sup> edition, Apractitioner’s guide to improving decision quality, 1999.	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	2	1	1	1	2	2
CO 2	2	1	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	2	1	1	2	1	1	1	2	2
Total	10	8	5	5	10	5	5	5	10	10
Course	2	2	1	1	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCABM4- INVESTMENT TECHNOLOGY

#### Course Outcomes:

CO1	C	Knowledge	<i>Describe</i> various methods to define Source of <i>investment information</i>
CO2	C	Understand	<i>Understand</i> and apply set <i>Interest Rates</i>
CO3	C	Knowledge	<i>Describe</i> and <i>apply</i> various <i>Shares and Valuation</i>
CO4	C	Understand	<i>Describe</i> and <i>solve</i> problems in <i>Portfolio Theory</i>
CO5	C	Understand	<i>Understand</i> Concept of learning the <i>Mutual Funds</i>

COURSE CODE	COURSE NAME	L	T	P	C
YCABM4	Investment Technology	4	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		4	0	0	4
<b>UNIT- I:Investment Information-Introduction</b>					<b>12</b>
Source of investment information -Valuation of debt securities: Debt prices and interest rate risk-Default risk and purchasing power risk.					
<b>UNIT- II:Interest Rates</b>					<b>12</b>
Market interest rates - term structure of interest rates- Valuation of warrants-convertibles- Option pricing models.					
<b>UNIT- III: Shares and Valuation</b>					<b>12</b>
Valuation of equity shares: Dividends and valuation: MMS arguments, fundamental analysis- Earning multipliers-Timing of purchase -sale of equity shares-Estimating earnings and risk.					
<b>UNIT- IV: Portfolio Theory</b>					<b>12</b>
Portfolio theory- Efficient investments –diversification-Markowitz graphical portfolio analysis-Capital market theory- Portfolio performance evaluation- sharpe.					
<b>UNIT- V: Mutual Funds</b>					<b>12</b>

Treynor- Jenson measures- Mutual funds - kinds and evaluation-Behaviour of share prices - technical analysis-The efficient markets-Hypothesis - random walk and Martingale methods.

LECTURE	TUTORIAL	TOTAL
60	0	60

#### TEXT

1. Clark N.et. al. "Financial Management: A Capital Market Approach". Helbrook, 1976

#### REFERENCES

2. Sharpe. W.F., "Investments". Prentice Hall of India. New Delhi. 1996.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	2	1	2	1	1	1	2	2
CO 2	2	2	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	2	1	1	2	1	1	1	2	2
Total	10	10	6	5	10	5	5	5	10	10
Course	2	2	1	1	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCABM5-BUSINESS FINANCE

#### Course Outcomes:

- CO1 C Knowledge *Describe* various methods to define financial and economic development
- CO2 C Understand *Understand* and apply primary and secondary capital market
- CO3 C Knowledge *Describe* and *apply* various managerial problems
- CO4 C Understand *Describe* and *solve* problems in non-banking financial institutions
- CO5 C Understand *Understand* Credit rating information

COURSE CODE	COURSE NAME	L	T	P	C
YCABM5	Business Finance	3	0	0	3



<b>C:P:A = 3:0:0</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT- I:Introduction to Business Finance</b>				<b>9</b>
Financial and economic development- Intermediation, role and patterns- Functions of money and capital markets- Interest rates, determination, term structure.				
<b>UNIT –II: Financial Intermediaries</b>				<b>9</b>
Primary capital market: new issues, growth and trends- Financial intermediaries: merchant bankers- managers, brokers, underwriters-Secondary market - organization and functioning- Trading and settlement.				
<b>UNIT – III: Managerial Problems</b>				<b>9</b>
Problems relating to membership- commission- margins- arbitration and off-floor trading- Reforming the markets- SEBI- Market for government securities-the discount and finance house-Operation and managerial problems of commercial banks.				
<b>UNIT- IV:Non-Banking Financial Institutions</b>				<b>9</b>
Inter-bank call money market- Non-banking financial institutions: lending policies, schemes, composition and quantum of assistance of IDBI. IFCI. ICICI, UTI- L1C, GIC and state level financial corporations.				
<b>UNIT- V: Credit Rating Information</b>				<b>9</b>
Credit rating information: Parameters. Role- Agencies- CRISIL- Regulatory framework for financial markets and institutions: regulation versus deregulation- Role of RBI-Bank rate, open market operation policies.				
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
	<b>45</b>	<b>0</b>	<b>45</b>	
<b>TEXT</b>				
1. Eddie MCLaney., “Business Finance Theory and practice “, 8 <sup>th</sup> edition , Pearson Education ,2009.				
<b>REFERENCES</b>				
1. Copeland, T.E., et. al, "Financial Theory and Corporate Policy". Addison Wesley, Reading, MA. 1988.				

2. Uppal.J.S., "Public Financial Institutions in India", Mac Millan, New York, 1984.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	2	2	2	1	1	1	2	2
CO 2	3	1	2	2	2	1	1	1	2	2
CO 3	2	2	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	3	2	2	2	2	1	1	1	2	2
Total	13	08	10	10	10	5	5	5	10	10
Course	3	02	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCABM6 TAXATION PRACTICES

#### Course Outcomes:

- CO1 C Knowledge *Characterize* various scheme of taxation  
 CO2 C Understand *Discuss* the various types of assessment  
 CO3 C Knowledge *Describe* the modes of recovery  
 CO4 C knowledge *Describe* and apply the wealth and health tax  
 CO5 C Understand *Understand* the issues state sales tax

COURSE CODE	COURSE NAME	L	T	P	C
YCABM6	Taxation Practices	3	0	0	3
<b>C:P:A =3:0:0</b>					
		L	T	P	H
		3	0	0	3
<b>UNIT- I: Assessment of undivided families</b>					<b>9</b>
Assessment of undivided families: Meaning-Basic conditions- Taxable income- Partitions- Tax planning- Assessment of firms and associations: Scheme of taxation- types- treatment of losses- Tax planning.					
<b>UNIT- II: Assessment of companies</b>					<b>9</b>

Assessment of companies: Types-profits-depreciation-tax planning-Section 80- Bonus issues- dividend policy-Return of income and assessment procedure: Types of assessment-Time limits-Reassessment-Cooperatives.

**UNIT – III: Collection and recovery of tax** **9**

Collection and recovery of tax: Deduction at source-rates-advance payment-Modes of recovery-Refund-Appeals and revision-Penalties.

**UNIT- IV: Wealth Tax** **9**

Wealth Tax: Chargeability-valuation-return-appeals-revisions-payment and recovery, gift tax: chargeability-rebate-assessment-appeals-revisions-payment and recovery.

**UNIT- V: Central sales tax** **9**

Central sales tax: Concept of sale and purchase-Inter-state trade-Inter-state export and import trade. State sale tax: Assessing authority-Single-multiple point tax-Procedure for registration and cancellation>Returns-payment-appeals and revisions.

LECTURE	TUTORIAL	TOTAL
45	0	45

**TEXT**

1. " Girish Ahuja & Ravi Gupta ",Systematic Approach to Income Tax, Bharat Law House Pvt. Ltd, New Delhi.
2. " Vinod K. Sinhanian & Monica Sinhanian", Income Tax, Taxmann Publications Pvt. Ltd, New Delhi.
3. " Mehtrotra & Goyal" ,Taxation Law & Practice, Sahitya Bhavan Publication, Agra.
4. "Lal B.B" , Direct Taxes, Konark Publishing House, New Delhi.
5. " VS.Datey", Indirect Taxes law and practice Taxman allied services pvt. Ltd.Books in India"

**REFERENCES**

1. Central and State tax acts,Singhanian, VK.,"**Taxman Direct Taxes**", Taxman, New Delhi. 1996.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	1	1
CO 2	2	1	1	1	1	1	1	1	1	1
CO 3	2	2	1	1	1	1	1	1	1	1

CO 4	2	2	1	1	1	1	1	1	1	1
CO 5	1	2	1	1	1	1	1	1	1	1
Total	09	08	05	05	05	05	05	05	05	05
Course	03	02	01	01	01	01	01	01	01	01

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCABM7MIS FRAMEWORKS AND IMPLEMENTATION

#### Course Outcomes:

- CO1 C Knowledge *Describe* variety of framework for identifying information technology
- CO2 C Understand *Discuss* the benefits of IT
- CO3 C Knowledge *Describe* the new strategic role of information system
- CO4 C knowledge *Describe* the business process reengineering
- CO5 C Understand *Discuss* the managing IT function

COURSE CODE	COURSE NAME	L	T	P	C
YCABM7	MIS Frameworks and Implementation	3	0	0	3
<b>C:P:A =3:0:0</b>					
		L	T	P	H
		3	0	0	3
<b>UNIT- I: Introduction to MIS</b>					<b>9</b>
This course will discuss a variety of frameworks for identifying information technology applications- The scope of IT applications would cover Management Information System- Decision Support System- Executive Information System and Expert System.					
<b>UNIT- II: Managing Data Resource</b>					<b>9</b>
Provide a broad understanding of the types of the benefits information technology applications can provide in an organization through transaction processing- management and operational control-decision support systems- office automation-organizational communications and group work support.					
<b>UNIT- III: IT Strategy</b>					<b>9</b>

Socio-economic environment and information systems in organization and the impact of information systems on organizations markets- frameworks for information systems planning-information systems and competitive advantage-the new strategic role of information systems: methodologies for evaluating investments in IT-frameworks and methodologies- should be discussed and illustrated with case studies.

**UNIT -IV: Business Process Integration with IT** **9**

Design of reporting system including a discussion of principles in indicator design-managing information support activity in organization- concept of the business process re-engineering (BPR) and how IT can enable BPR

**UNIT- V: Managing IT function** **9**

Critical success factor in implementing IT applications including the need for managing the process of change illustrated through case studies of successful/failed IT projects-Critical role of security in implementing IT applications should be discussed.

	LECTURE	TUTORIAL	TOTAL
	45	0	45

**TEXT**

1. Kenneth C.Laudon.Jane P.Laudon, "Management information systems", Pearson, 14th edition.

**REFERENCES**

1. David olson, "Information system project manangement",2015.
2. Paige baltzan, Amy phillips , "Business - Driven Information System",2015.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
<b>CO 1</b>	3	3	2	2	2	1	1	1	2	2
<b>CO 2</b>	3	3	2	2	2	1	1	1	2	2
<b>CO 3</b>	3	3	2	2	2	1	1	1	2	2
<b>CO 4</b>	3	2	2	2	2	1	1	1	2	2
<b>CO 5</b>	2	2	2	2	2	1	1	1	2	2
<b>Total</b>	14	13	10	10	10	5	5	5	10	10
<b>Course</b>	3	3	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

## YCABM8- MANAGEMENT OF SOFTWARE PROJECTS

### Course Outcomes:

- CO1 C Knowledge *Describe* various methods to define Software projects
- CO2 C Understand *Understand* and apply project scheduling and project management.
- CO3 C Knowledge *Describe* and *design* system life cycle
- CO4 C Understand *Describe* and *solve* problems related to the project
- CO5 C Understand *Understand* and determine skill requirements

Course Code	Course Name	L	T	P	C
YCABM8	Management of Software Projects	4	0	0	3
<b>C:P:A = 3:0:0</b>					
		L	T	P	H
		4	0	0	4
<b>UNIT- I:-Introduction</b>					<b>12</b>
Managerial Issues in Software Projects-Introduction to software markets-Planning of software projects-Size and Cost Estimations.					
<b>UNIT –II: Project Scheduling and Management</b>					<b>12</b>
Project Scheduling-Measurement of software quality and productivity-ISO and Capability Maturity Models for organizational growth-Project management and Practice.					
<b>UNIT- III: System life cycle and Design</b>					<b>12</b>
Managing the systems life cycle- requirements determination-logical design-physical design- testing-implementation.					
<b>UNIT- IV: Integration issues and Project Management</b>					<b>12</b>
System and database integration issues-metrics for project management and systems performance evaluation-managing expectations- superiors-users-team members and other related to the project.					
<b>UNIT- V: Cost Effectiveness Analysis</b>					<b>12</b>

Determining skill requirements and staffing the project-cost-effectiveness analysis-reporting and presentation techniques-and effective management of both behavioural and technical aspects of the project.

	LECTURE	TUTORIAL	TOTAL
	60	0	60

#### TEXT

1. Gilb, T., "Principles of Software Engineering Management", Addison Wesley. Reading. M.A. 1988.
2. Putnam. L.H . Myers. W., "Industrial Sire"" Software - Effective Management using Measurement". IEEE C.S. Press. 1997.

#### REFERENCES

1. Dr.Jeroen Arnoldus, Dr.Sieuwert Van Otterloo, Dr.Joost Schalken-Pinkster, "Software Project Management", ICT Institute
2. Lean Agile and Kanban , " Software Engineering Management", on Pawel Brodzinski
3. "Principles of Software Development Leadership: Applying Project Management Principles to Agile Software Development" by Ken Whitaker.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
<b>CO 1</b>	3	3	2	2	2	1	2	2	3	3
<b>CO 2</b>	2	2	2	2	2	1	2	2	3	3
<b>CO 3</b>	2	1	2	2	2	1	2	2	3	3
<b>CO 4</b>	2	2	2	2	2	1	2	2	2	2
<b>CO 5</b>	2	1	2	2	2	1	2	2	2	2
<b>Total</b>	11	09	10	10	10	5	10	10	13	13
<b>Course</b>	03	02	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCABM9 BLOCK CHAIN

#### Course Outcomes:

CO1 C Knowledge *Describe* distributed database

CO2	C	Understand	<i>Understand</i>	block chain network
CO3	C	Understand	<i>Understand</i>	crypto currency and bit coin
CO4	C	Understand	<i>Understand</i>	crypto currency regulation
CO5	C	Apply	<i>Apply</i>	block chain applications

COURSE CODE	COURSE NAME	L	T	P	C
YCA*	BLOCK CHAIN	4	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		4	0	0	4
<b>UNIT-I: INTRODUCTION TO BLOCK CHAIN</b>					12
Introduction, Advantage over conventional distributed database, Block chain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public block chain.					
<b>UNIT-II: DISTRIBUTED CONSENSUS</b>					12
Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.					
<b>UNIT – III: CRYPTOCURRENCY</b>					12
Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin					
<b>UNIT- IV: CRYPTOCURRENCYREGULATION</b>					12
Cryptocurrency Regulation: Stakeholders, Roots of Bitcoin, Legal Aspects - Cryptocurrency Exchange, Black Market and Global Economy.					
<b>UNIT-V: BLOCK CHAIN APPLICATIONS</b>					12
Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.					
		LECTURE	TUTORIAL	TOTAL	
		60	-	60	
<b>TEXT</b>					
1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).					
2. Blockchain for Beginners: The Complete Step by Step Guide to Understanding Blockchain Technology by Mark Watney					



**Reference**

1. Cryptocurrencies and Blockchains by Quinn DuPont
2. Blockchain Applications: A Hands-On Approach Paperback by Arshdeep Bahga

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	1	2	2	2	1	1	1	2	2
CO 2	3	1	2	2	2	1	1	1	2	2
CO 3	2	1	2	2	2	1	1	1	2	2
CO 4	2	1	2	2	2	1	1	1	2	2
CO 5	3	2	2	2	2	1	1	1	2	2
<b>Total</b>	13	6	10	10	10	5	5	5	10	10
<b>Course</b>	3	2	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

**4. Curicullum and Syllabus for the MCA programme-After revision****REGULATION 2020****SEMESTER- I**

Course Code	Course Title	L	T	P	H	C
YCA101	Database Management Systems	4	1	0	5	4
<b>YCA102</b>	<b>Computer Networks</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>4</b>

YCA103	Object Oriented Programming, Analysis and Design	4	0	0	4	4
YCA104	Management Support Systems	3	0	0	3	3
YCA105	Mathematical Foundation for Computer Applications	4	1	0	5	5
YCA106	Database Management Systems Lab	0	0	4	4	2
YCA107	Mathematical Foundation for Computer Applications Lab using Java	0	0	4	4	2
<b>Total</b>		<b>19</b>	<b>03</b>	<b>08</b>	<b>30</b>	<b>24</b>

### SEMESTER- II

Course Code	Course Title	L	T	P	H	C
YCA201	Advanced Operating System Concepts	4	1	0	5	4
YCA202	Software Engineering	4	1	0	5	4
YCAIT*	IT Elective I	4	0	0	4	4
YCA203	Advanced Data Structures	4	0	0	4	3
YCABM*	BM Elective I	3	0	0	3	3
YCA205	Advanced Operating System Concepts Lab	0	0	4	4	2
YCA206	Case Tools Lab	0	0	4	4	2
<b>Total</b>		<b>19</b>	<b>02</b>	<b>08</b>	<b>29</b>	<b>22</b>

### SEMESTER- III

Course Code	Course Title	L	T	P	H	C
YCA301	Artificial Intelligence and Machine Learning	4	0	0	4	4
YCA302	Graphics and Multimedia	3	0	0	3	3
YCAIT*	IT Elective II	3	0	0	3	3

YCABM*	BM Elective II	3	0	0	3	3
YCA303	Optimization Techniques	4	0	0	4	4
YCA304	Artificial Intelligence and Machine Learning Lab using Python	0	0	4	4	2
YCA305	Optimization Techniques Lab	0	0	4	4	2
YCA306	Industrials Lectures	0	0	2	2	2
YCA307	Mini Project	0	0	3	3	2
<b>Total</b>		<b>17</b>	<b>0</b>	<b>13</b>	<b>30</b>	<b>25</b>

#### SEMESTER-IV

Course Code	Course Title	L	T	P	H	C
YCA401	Research Methodology(Paper Publications)	3*(SS)	0	-	3	3
YCA402	Project	0	0	6	6	12
<b>Total</b>		<b>3*(SS)</b>	<b>0</b>	<b>06</b>	<b>09</b>	<b>15</b>

**Total Credits : 86**

#### INFORMATION TECHNOLOGY ELECTIVES

##### IT Elective I

Course Code	Course Title	L	T	P	H	C
YCAEE1	Data Mining and Data Warehousing	4	0	0	4	4
YCAEE2	High Performance Computing	4	0	0	4	4
YCAEE3	Compiler Design	4	0	0	4	4
YCAEE8	System Analysis and Simulation	4	0	0	4	4
YCAEE9	Cryptography and Information Security	4	0	0	4	4

##### IT Elective II

Course Code	Course Title	L	T	P	H	C
YCAEE4	Cloud Computing	3	0	0	3	3

YCAEE5	Distributed Database Management	3	0	0	3	3
YCAEE6	Image Processing	3	0	0	3	3
YCAEE7	Parallel Programming	3	0	0	3	3
YCAEE10	Bigdata Analytics	3	0	0	3	3

## BUSINESS MANAGEMENT ELECTIVES

### BM Elective I

Course Code	Course Title	L	T	P	H	C
YCABM3	Foundations of Decision Processes	3	0	0	3	3
YCABM4	Investment Technology	3	0	0	3	3
YCABM8	Management of Software Projects	3	0	0	3	3
YCABM9	Blockchain Technology	3	0	0	3	3

### BM Elective II

Course Code	Course Title	L	T	P	H	C
YCABM1	Managerial Economics	3	0	0	3	3
YCABM2	Corporate Planning	3	0	0	3	3
YCABM5	Business Finance	3	0	0	3	3
YCABM6	Taxation Practices	3	0	0	3	3
YCABM7	MIS Frameworks and Implementation	3	0	0	3	3

## YCA101- DATABASE MANAGEMENT SYSTEMS

### Course Outcomes:

- CO1 C Knowledge *Describe* the database architecture and its application
- CO2 C Understand *Describe* about the relational model and algebra
- CO3 C Understand *Explain* the data model and accessing of data.

- CO4 C Knowledge *Describe* the normalization concept for a table of data
- CO5 C Understand *Illustrate* the query technical processing in database management

Course Code	Course Name	L	T	P	C
YCA101	Data Base Management Systems	4	1	0	4
C:P:A = 4:0:0		L	T	P	H
		4	1	0	5
<b>UNIT- I: Introduction to database Management System</b>					<b>15</b>
Basic concepts-Database & Database Users-Characteristics of the Database-Database Systems-Concepts & Architecture-Data Models. Schemas & Instances-DBMS Architecture & Data Independence-Data Base languages & Interfaces-Data Modeling using the Entity-Relationship Approach					
<b>UNIT- II : Relational Model Concept</b>					<b>15</b>
Relational Model - Languages & Systems - Relational-Data Model & Relational -Algebra Relational Model Concepts-Relational Model Constraints-Relational Algebra-SQL – A Relational Database Language-Data Definition in SQL-View & Queries in SQL-Specifying Constraints & Indexes in SQL-Specifying Constraints & Indexes in SQL a Relational Database Management Systems-ORACLE/INGRES					
<b>UNIT- III : Data model</b>					<b>15</b>
Conventional Data Models & Systems Network-Data Model & IDMS Systems Membership types & options in a set DML for the network model-Navigation within a network database- Hierarchical Data Model & IMS System-Hierarchical Database structure- HSAM - HISAM - HDAM & HIDAM organization-DML for hierarchical model-Overview of IMS					
<b>UNIT- IV: Relational Data Base Design</b>					<b>15</b>
Relational Data Base Design-Function Dependencies & Normalization for Relational - Databases - Functional Dependencies-Normal forms based on primary keys (1NF, 2NF, 3NF & BCNF)-Lossless join & Dependency preserving decomposition					
<b>UNIT- V: Concurrency Control &amp; Recovery Techniques</b>					<b>15</b>
Concurrency Control & Recovery Techniques-Concurrency Control Techniques-Locking Techniques-Time stamp ordering-Granularity of Data items-Recovery Techniques- Recovery concepts-Database backup and recovery from catastrophic failures - Concepts of Object oriented data base management systems					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	

	<b>60</b>	<b>15</b>	<b>75</b>
<b>TEXT</b>			
1. Abraham Silberschatz, Henry Korth, S.Sudarshan, Database Systems Concepts, Sixth Edition, McGraw Hill, 2010.			
2. Raghu Ramakrishnan and Johannes Gehrke, Database management systems, Third Edition, 2002			
<b>REFERENCES</b>			
1. Date, C.J., "An Introduction to Database Systems", Narosa Publishing House, New Delhi.			
2. Desai, B'., "An Introduction to Database Concepts", Galgotia Publications, New Delhi.			
3. Elmsari and Navathe, "Fundamentals of Database Systems", Addison Wesley, New York.			
4. Ullman, J.D., "Principles of Database Systems", Galgotia Publications, New Delhi			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	3	3	3	2	2	3	3
CO 2	3	3	3	2	2	2	2	2	3	3
CO 3	3	2	2	2	2	2	2	2	3	3
CO 4	2	3	2	2	2	2	2	2	2	2
CO 5	3	2	2	2	2	2	2	2	2	2
Total	14	13	12	11	11	11	10	10	13	13
Course	3	3	3	3	3	3	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### **YCA102 COMPUTER NETWORKS**

#### **Course Outcomes:**

CO1	C	Understand	<i>Define</i> various methods of topology
CO2	C	Understand	<i>Understand</i> and apply layer protocol
CO3	C	Understand	<i>Illustrate</i> various counting and inclusion theory
CO4	C	Understand	<i>Describe</i> LAN concepts
CO5	C	Understand	<i>Explain</i> TCP/IP

Course Code	Course Name	L	T	P	C
YCA102	Computer Networks	4	1	0	4
C:P:A = 4:0:0		L	T	P	H
		4	1	0	5
<b>UNIT- I: Introduction to computer network</b>					<b>15</b>

Advantages of networks - structure of the communications network - point-to-point and multi drop circuits - data flow and physical circuits - network topologies - topologies and design goals - Hierarchical topology - horizontal topology (Bus) - star topology - ring topology - mesh topology - The telephone network - switched and non-switched options - fundamentals of communications theory - channel speed and bit rate - voice communications and analog waveforms - bandwidth and the frequency spectrum - connecting the analog and digital worlds - digital worlds - digital signals - the modem - asynchronous and synchronous transmission - Wide area and local networks - connection oriented and connectionless networks, classification of communications protocols - time division multiple access (TDMA) - time division multiplexing (TDM) - carrier sense (Collision) systems - token passing - peer-to-peer priority systems - priority slot - carrier sense (collision free) systems - token passing (priority) systems.

**UNIT- II: Layered Protocols and the OSI model** **15**

Goals of Layered Protocols - network design problems - communication between layers - introduction to standard organizations and the OSI model - standards organizations - Layers of OSI - OSI status - Polling/Selection Protocols : Character and bit protocols - binary synchronous control (BSC) HDLC - HOLC options - HDLC frame format - code transparency and synchronization - HDLC transmission process - HDLC subsets - SDLC - Protocol conversion.

**UNIT- III: Local Area Networks** **15**

Way LANs - Primary attributes of a LAN - Broadband and baseband and base LANs - IEEE LAN standards - relationship of the 802 standards to the ISO/CCITT model - connection options with LANs - LLC and MAC protocol data units - LAN topologies and protocols - CSMA/CO and IEEE 802.3 - token ring (Priority) - token bus and IEEE 802.4 - metropolitan area networks (MANs) - ANSI fiber distributed data interface - Switching and Routing in Networks: Message switching - packet switching - when and when not to use packet switching - packet routing - packet switching support to circuit switching networks.

**UNIT- IV: The X.25 Network and Supporting Protocols** **15**

Features of X.25 - Layers of X.25 and the Physical layer - X.25 and the data link layer - companion standards to X.25 - features of X.25 - X.25 channel options - flow control principles - other packet types - X.25 logical channel states - packet formats - Internet working - connectionless mode networks - the frame relay and X.25 stacks.

**UNIT- V: TCP/IP and Personal Computer Networks** **15**

TCP/IP and internetworking - example of TCP/IP operations - related protocols ports and sockets - The IP address structure - major features of IP - IP datagram - Major IP services - IP source routing - value of the transport layer - TCP - Major features of TCP - passive and active operation - the transmission control block (TCP) - route discovery protocols - examples of route discovery protocols - application layer protocols

Personal computer communications: Characteristics - error handling - using the personal computer as a server - linking the personal computer to mainframe computers - tilt: transfer on personal computers - personal computers and local area networks - network operating systems (NOSs) - common IBM PC LAN protocol stacks.

LECTURE	TUTORIAL	TOTAL
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	<b>60</b>	<b>15</b>	<b>75</b>
<b>TEXTBOOK</b>			
1. Andrew S. Tanenbaum, Computer Networks, Fourth Edition, Prentice Hall PTR; 4th edition, 2002			
2. Computer Networking: A Top-Down Approach, by J. F. Kurose and K. W. Ross, Addison Wesley, 5th Edition, March 2009, ISBN-13: 978-0136079675. (Chapters 1-6)			
<b>REFERENCE</b>			
1. Black, V., "Computer Networks· Protocols, Standards and Interfaces", Prentice Hall of India, 1996			
2. Stallings, W., "Computer Communication Networks", (4th edition). Prentice Hall of India.1993.Tannebaum, A.S .. "Computer Networks", Prentice Hall of India, 19'81.			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### YCA103 - OBJECT ORIENTED PROGRAMMING, ANALYSIS AND DESIGN

#### Course Outcomes

- CO1 C Knowledge    *Describe* various methods to define object modelling
- CO2 C Understand    *Understand* and construct modeling concepts
- CO3 C Knowledge    *Describe* and *Discuss the* concepts of operations
- CO4 C Knowledge    *Describe* and apply the concepts of designs
- CO5 C Knowledge    *Describe* the concepts of implementation of an application

Course Code	Course Name	L	T	P	C
YCA103	Object Oriented Programming, Analysis and Design	4	0	0	4
C:P:A = 4:0:0		L	T	P	H



			<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>UNIT- I: Object modeling</b>						<b>12</b>
Object modelling: Objects and classes - Links and associations - Generalization and inheritance.						
<b>UNIT- II: Grouping constructs</b>						<b>12</b>
Grouping constructs - Aggregation - Generalization as extension and restriction -Multiple inheritance - Meta data - candidate keys - Dynamic modelling: Events and states Nesting – Concurrency						
<b>UNIT – III: Functional modeling</b>						<b>12</b>
Functional modelling: Data flow diagrams - Specifying operations - Analysis: Object modelling - Dynamic modelling - functional modelling - Adding operations - Iteration.						
<b>UNIT- IV: System design and object design</b>						<b>12</b>
System design: Subsystems - Concurrency - Allocation to processors and tasks - Management of data stores - Control implementation -. Boundary condition - Architectural frameworks - Object design: Optimization - implementation of control - Adjustment of inheritance - Design of associations - Documentation - Comparison of methodologies.						
<b>UNIT -V : Implementation</b>						<b>12</b>
Implementation: Using a programming language - a database system - Programming styles - reusability - extensibility - robustness - Programming-in-the-large - case study.						
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>		
		<b>60</b>	<b>0</b>	<b>60</b>		

### TEXT

1. Craig Larman, "Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education, 2005
2. Alan Dennis, Barbara H. Wixom, and David Tegarden, Systems Analysis And Design with UML Version 2.0—An Object-Oriented Approach, 3rd edition, John Wiley & Sons, Inc., 2009 (required)
3. T5. Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides, Design Patterns: Elements of Reusable Object-Oriented Software, Addison Wesley.
4. OBJECT-ORIENTED ANALYSIS AND DESIGN With applications SECOND EDITION Grady Booch Rational Santa Clara, California

### REFERENCES

1. Booch, G., "Object Oriented Analysis and Design". 2nd edition, Benjamin/Cummins Publishing Co .. Redwood City, CA, U.S.A., 1994.
2. Rebecca Wirfs-Brock, et. al, Designing Object Oriented Software", Prentice Hall of India.1996.
3. Rumbaugh, J., Et al "Object Oriented Modelling and Design". Prentice Hall of India, New Delhi, 1991

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA104-MANAGEMENT SUPPORT SYSTEMS

#### Course Outcomes

- CO1 C Knowledge *Discuss* about DSS concept and components  
CO2 C Understand *Describe* the data and model management for DSS  
CO3 C Knowledge *Describe* about various DSS functionality  
CO4 C Understand *Understand* the concept of DSS Interface and Group discussion  
CO5 C Understand *Describe* Expert System

Course Code	Course Name	L	T	P	C
YCA104	Management Support Systems	3	0	0	3
C:P:A = 3:0:0		L	T	P	H
		3	0	0	3
<b>UNIT- I: Introduction</b>					<b>09</b>
Introduction to the concept of Decision Support System - Components of DSS - Dialogue Management					
<b>UNIT –II: Decision Support System</b>					<b>09</b>
Data Management and Model Management for DSS - Examples of different type of DSS - Systems Analysis and Design for DSS					
<b>UNIT – III: DSS functionality</b>					<b>09</b>
Models in the context of DSS - Algorithms and Heuristics - DSS Applications in different functions					

<b>UNIT- IV: Interface and Group Discussion</b>			<b>09</b>
Design of interfaces in DSS - An overview of DSS generators - Group Decision in Support Systems (GDSS) and Decision Conferencing.			
<b>UNIT -V :Introduction of Expert Systems</b>			<b>09</b>
Introduction of Expert Systems - Expert Systems in Management - Case Study on Expert System - Introduction to GIS - MSS based on GIS - Case Studies; Executive Information Systems (EIS).			
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>45</b>	<b>0</b>	<b>45</b>

**TEXT**

1. Lucas, H.C., "Information system concepts for management", 5th edition, McGraw Hill, New York. 1994.
2. W S Jawadekar , A O'Brien ., "Management Information Systems"
3. Laaudon and Ludon, "Management Information Systems".

**REFERENCES**

1. Bhatnagar, S.C. and Ramani K. V., "Computers and Information Management", Prentice Hall of India. New Delhi, 1992.
2. Issue dedicated of GDSS & Expert Systems, JMIS, 10, 3, 1993-94.
3. Kroenke, D., "Management information systems", 2nd edition, Mitchell McGraw Hill, New York. 1992.
4. Maryam Alvi, "Group Decision support Systems, Info. Sys. Mgt (ISM)", Vol. 8. No.3 Summer 91 .
5. Sprauge, R.H., and McNurlin, B.C., "Information Systems Management in Practice", 3rd ed.
6. Prentice Hall international. New Jersey, 1993.
7. Sprague. R.H. and Carlson, E.D . ."Building Effective Decision Support Systems", Prentice Hall. New Jersey, 1982.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
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CO 1	2	1	1	1	1	1	1	1	1	1
CO 2	2	1	1	1	1	1	1	1	1	1
CO 3	2	2	1	1	1	1	1	1	1	1
CO 4	2	2	1	1	1	1	1	1	1	1
CO 5	1	2	1	1	1	1	1	1	1	1
Total	09	08	05	05	05	05	05	05	05	05
Course	03	02	01	01	01	01	01	01	01	01

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA105 - MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

#### Course Outcomes:

CO1	C	Knowledge	<i>Discuss the basic fundamentals of statistics and measures</i>
CO2	C	Understand	<i>Identify the concept of sampling technique</i>
CO3	C	Knowledge	<i>Describe about the charts and analysis</i>
CO4	C	Understand	<i>Discuss about the statistics analysis</i>
CO5	C	Understand	<i>Describe the various implementation</i>

Course Code	Course Name	L	T	P	C
YCA105	Mathematical foundation for Computer Applications	4	1	0	5
C:P:A = 5:0:0		L	T	P	H
		4	1	0	5
<b>UNIT- I: Introduction</b>					<b>15</b>
Basic Statistics: Measures of central tendencies - Measures of dispersion - Frequency distributions - Moments - Correlation coefficient - Regression.					
<b>UNIT- II: Sampling statistical computing</b>					<b>15</b>
Sampling: Theory of sampling - population and sample - Survey methods and estimation Statistical inference - Testing of hypothesis and inference					
<b>UNIT- III: Statistics For Business</b>					<b>15</b>
Computing frequency charts - Regression analysis.					
<b>UNIT- IV: Data Analysis</b>					<b>15</b>
Time series and forecasting					
<b>UNIT- V: Implementation</b>					<b>15</b>

Implementation: Using a programming language - a database system - Programming styles - reusability - extensibility - robustness - Programming-in-the-large - case study.

LECTURE	TUTORIAL	TOTAL
60	15	75

### TEXT

1. Tanner, M. A., "Tools for Statistical Inference: Methods for the Exploration of Posterior Distribution" Springer Verlag: New York., third Edition., 1996

### REFERENCES

1. Affi, A.A., "Statistical Analysis: A Computer Oriented Approach". Academic Press, New York, 1979. Hogg, R. v. Et. Al., "Introduction to Mathematical Statistics", American Publishing, New York. 1980.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	2	2	1	2	2	2	2	2	2
CO 2	3	2	2	2	2	2	2	2	2	2
CO 3	2	2	2	2	2	2	2	2	2	2
CO 4	2	2	2	1	2	2	2	2	2	2
CO 5	2	2	2	2	2	2	2	2	2	2
Total	12	10	10	8	10	10	10	10	10	10
Course	3	2	2	1	2	2	2	2	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

## YCA106 -DATABASE MANAGEMENT SYSTEMS LAB

### Course Outcomes:

CO1	P	Guided response	<b>Build</b> the concept of DBMS programming and its fundamental
CO2	P	Guided response	<b>Build</b> an application program using concepts
CO3	P	Apply Guided Response	<b>Develop</b> an application program using a data model <b>Develop</b> the query technical processing in database managements
CO4	P	Guided response	<b>Explain</b> and <b>Implement</b> the normalization concept for a table of data

CO5 A Apply

Apply the query technical processing in database managements

Course Code	Course Name	L	T	P	C
YCA106	Database Management Systems Lab	0	0	4	2
C:P:A = 0:1.5:0.5		L	T	P	H
		0	0	4	4
					60`

1. Create table in SQL using Accounting for a shop database
2. Develop a Database design in E-R model and Normalization using Database manager for a magazine agency or newspaper agency
3. Implement the Nested Queries using Ticket booking for performances
4. Create views for a particular table using Preparing greeting and birth day cards Personal accounts - insurance, loans, mortgage payments etc.
5. Implement Join operations in SQL using Doctor's diary, billing
6. create a program to implement JDBC connectivity using Personal bank account
7. create a program to implement ODBC connectivity using Class marks management
8. Create a webpage for Video tape library using JDBC Connectivity
9. How to update a data by using JDBC connectivity with Personal library.
10. Create a webpage for Class marks management library using JDBC Connectivity.
11. Write PL/SQL procedure for an application using Hostel accounting
12. Write PL/SQL procedure for an application using History of cricket scores
13. Write PL/SQL procedure for an application using Cable transmission program manager

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10

Course	3	2	2	1	2	2	2	2	3	3
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0-No relation 3- Highly relation 2- Medium relation 1- Low relation

## YCA107 - MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

### LAB USING JAVA

#### Course Outcomes:

CO1	P	Guided Response	<i>Practice the basic</i> Computer generation of random numbers
CO2	A	Apply	<i>Understand</i> and apply set theory and Relations
CO3	P	Guided Response	<i>Describe</i> various counting and inclusion theory
CO4	A	Apply	<i>Apply</i> frequency charts for large data sets
CO5	A	Apply	<i>Apply</i> statistical package to perform factor analysis and tests of significance

Course Code	Course Name	L	T	P	C
YCA107	Mathematical Foundation for Computer Applications Lab using Java	0	0	4	2
C:P:A = 0:1:1		L	T	P	H
		0	0	4	4
					60
1. Computer generation of random numbers with different distributions. 2. Writing a questionnaire analysis program for data from surveys. 3. Analysis of significance of the results of survey. 4. Curve fitting to experimental data. 5. Programs to obtain frequency charts for large data sets and fitting a distribution. 6. Use of a statistical package to perform factor analysis and tests of significance. 7. Calculating and displaying regression statistics. 8. <u>Real Statistics Using Excel</u> 9. Calculating and displaying correlation statistics					
		LECTURE	PRACTICAL	TOTAL	
		0	60	60	

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2

CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

## YCA201 ADVANCED OPERATING SYSTEMS CONCEPTS

### Course Outcomes:

- CO1 C Understand *Explain* the operating system functions
- CO2 C Understand *Implement* the process and various process scheduling algorithms
- CO3 C Knowledge *Outline* process cooperation and inter process communication
- CO4 C Understand *Describe* various memory management concepts
- CO5 C Understand *Implement* and *understand* the file organization

COURSE CODE	COURSE NAME	L	T	P	C
YCA201	ADVANCED OPERATING SYSTEMS CONCEPTS	4	1	0	4
C:P:A = 4:0:0					
		L	T	P	H
PREREQUISITE	C++ concepts, Windows Programming	4	1	0	5
<b>UNIT I OVERVIEW OF OPERATING SYSTEMS</b>					<b>15</b>
Functionalities and objectives of operating Systems- processor register- instruction execution- interrupts- types of interrupts.					
<b>UNIT II PROCESS MANAGEMENT</b>					<b>15</b>
Process concepts: process states- process control block- process and threads- processor scheduling- scheduling algorithms.					
<b>UNIT III PRINCIPLES OF CONCURRENCY</b>					<b>15</b>



Critical Sections - Mutual Exclusion - Process Cooperation- Inter Process Communication- Deadlock Prevention- Detection- Avoidance- Semaphores- Monitors-Message Passing.

**UNIT IV MEMORY MANAGEMENT** **15**

Virtual Memory Concepts- Paging and Segmentation- Address Mapping- Virtual Storage Management- Page Replacement Strategies.

**UNIT V FILE ORGANIZATION** **15**

Blocking and buffering, file descriptor- file and directory structures- I/O devices- disk scheduling.

	<b>LECTUR E</b>	<b>TUTORIA L</b>	<b>PRACTICAL S</b>	<b>TOTA L</b>
	<b>60</b>	<b>15</b>	<b>-</b>	<b>75</b>

**TEXT**

1. William Stallings, Operating Systems , Prentice Hall of India (P) Ltd, 7<sup>th</sup> edition-2012.
2. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, Sixth edition. Addison-Wesley (2003).

**REFERENCES**

1. Andrew Tanenbaum, “Modern Operating Systems”, Pearson, 2008.
2. Silberschatz and P. B. Galvin, “Operating System Concepts”, 7<sup>th</sup> Edition, Addison Wesley Publication.

**E REFERENCES**

1. <http://www.nptel.ac.in/courses/106108101/>
2. [http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New\\_index1.html](http://nptel.ac.in/courses/Webcourse-contents/IISc-BANG/Operating%20Systems/New_index1.html)
3. <http://www.nptel.ac.in/downloads/106108101/>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1– Low relation

## YCA202 - SOFTWARE ENGINEERING

### Course Outcomes:

- CO1 C Knowledge *Describe* various methods to define lifecycle models.
- CO2 C Understand *Understand* and analyse the software inspections
- CO3 C Knowledge *Describe* and *apply* various software tools
- CO4 C Understand *Describe* and *solve* issues in modern GUI
- CO5 C Understand *Understand* CASE tools and Software configuration management.

Course Code	Course Name	L	T	P	C
YCA202	Software Engineering	4	1	0	4
<b>C:P:A = 4:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>4</b>	<b>1</b>	<b>0</b>	<b>5</b>
<b>UNIT- I: Software life cycle</b>					<b>15</b>
Models: Waterfall, Spiral - Prototyping Fourth generation techniques - SW Process - Software requirements specification (SRS)Fact-Finding Techniques - Characteristics of a good SRS: Unambiguous. Complete - Verifiable - Consistent - Modifiable - Traceable and usable during the operation and Maintenance phase - Prototype outline for SRS.					
<b>UNIT- II: Software Inspection</b>					<b>15</b>
Communication Skills for the System Analyst - Review/Inspection Procedure: Document. Composition of the inspection team - check list - reading by the inspectors - Recording of the defects and action recommended - Students should practice inspecting small requirement specifications for good characteristics.					
<b>UNIT- III: System Analysis and SW Design</b>					<b>15</b>
SA tools & Techniques - DFD - Entity Relationship Diagrams - Project Dictionary - System Design Tools and Techniques - Prototyping - Structured Programming.					
<b>UNIT- IV: User Interface Design and User Manual</b>					<b>15</b>
Elements of good design - Design issues - Features of a modern GUI - Menus - scrolling - windows - Icons - Panels - Error messages, etc.					
User Profile - Contents of an User Manual: Student is urged to install and use a software using its user manual and report the strengths and weaknesses of that user manual.					

**UNIT- V: Software Configuration Management and CASE****15****Software Configuration Management**

Base Line - SCM process - Version Control - Change Management.

**Computer Aided Software Engineering**

CASE - Tools for Project management Support - Analysis &amp; design - Programming - Prototyping - Maintenance - Future of CASE.

LECTURE	TUTORIAL	TOTAL
60	15	75

**TEXT**

1. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
3. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
4. Ian Sommerville, Software Engineering, Addison Wesley.
5. Kassem Saleh, "Software Engineering", Cengage Learning.
6. Pfleeger, Software Engineering, Macmillan Publication

**REFERENCES**

1. Beizer, B., "Software Testing Techniques", Second Edition. Van Nostrand Reinhold. New York. 1990.
2. IEEE Guide to Software Requirements Specifications, Std 830-1984. In" IEEE Standards Collection. 1993. Available from IEEE Standards Board, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331. NJ, USA.
3. IEEE Standard for Software User Documentation, Std 1063-1987.
4. Pressman, R.S., "Software engineering" A Practitioner's Approach", Third Edition, McGraw Hill. International Edition, 1992.
5. Whitten, Bentley and Barlow, "System Analysis and Design Methods", Second Edition, Galgotia Publications, 1996.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	2	2	1	1	1	2	2
CO 2	3	3	3	2	2	1	1	1	2	2
CO 3	3	3	3	2	2	1	1	1	2	2
CO 4	3	3	3	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	14	14	10	10	5	5	5	10	10
Course	3	3	3	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

## YCA203 ADVANCED DATA STRUCTURES

### Course Outcomes:

- CO1 C Understand *Illustrate* the classification of Linear Data Structures.  
 CO2 C Understand *Explain* the functions of Non Linear Data Structures  
 CO3 C Understand *Describe* the operations of Advanced Data Structures  
 CO4 C Knowledge *Explain* the various algorithms of Data Structures  
 CO5 C Understand *Describe* the concepts and procedures sorting.

COURSE CODE	COURSE NAME	L	T	P	C
YCA203	Advanced Data Structures	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
PREREQUISITE	C Programming	4	0	0	4
<b>UNIT- I: LINEAR DATA STRUCTURES</b>					<b>12</b>
Linear data Structures – Arrays, Records, Linked Lists – Singly, Doubly, Circular linked lists - Stack: Definition and examples, Representing Stacks - Queues: Definition and examples, priority queue, Dequeue, IRD, ORD – Applications of Stack, Queue and Linked Lists- Hashing					
<b>UNIT –II: NON-LINEAR DATA STRUCTURES</b>					<b>12</b>
Non-Linear data Structures - Binary Trees – Binary Tree Representations – node representation, internal and external nodes, implicit array representation - Operations on binary trees – Binary tree Traversals – Binary search trees- insertion, deletion, find. Graphs – Representation – Linked representation of Graphs – Graph Traversals.					
<b>UNIT- III: ADVANCED CONCEPTS</b>					<b>12</b>
Advanced data structures –Data structures for disjoint sets- AVL trees - Red-black trees – insertion and deletion – B-trees – Definition, insertion, deletion – Splay tree, Binomial heaps – operations.					
<b>UNIT- IV: ALGORITHMS`</b>					<b>12</b>
Single source shortest path algorithms – Bellman-Ford algorithm and Dijkstra's algorithm- Transitive closure -Topological sort – Trie Structures.					
<b>UNIT- V: SORTING TECHNIQUES</b>					<b>12</b>
Basic sorting techniques – selection sort, bubble sort, insertion sort - Merging and merge sort – Basic Search Techniques – linear search and binary search – recursive and non-recursive algorithms.					
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICALS</b>	<b>TOTAL</b>	
	<b>60</b>	<b>0</b>	<b>0</b>	<b>60</b>	

**TEXT**

1. A.K. Sharma, "Data Structures using C", Pearson Education, 2013
2. Robert L. Kruse "Data Structures and Program Design in C", Pearson Education, 2013
3. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C.Stein, "Introduction to Algorithms", 3rd Edition, MIT Press, 2009.
4. S. Lipschutz and G.A.V. Pai, "Data Structures", Tata McGraw-Hill, 2010.

**REFERENCES**

1. Robert L Kruse: Data Structures and program designing using C, 2013.
2. Kamthane: Introduction to Data Structures in C, Pearson Education, 2005
3. M.A.Weiss, "Data Structures and Problem Solving using Java", 4th Edition, Addison Wesley, 2009.
4. D. Samanta, "Classic Data Structures", 2nd Edition, PHI, 2009.
5. P. Brass, "Advanced Data Structures", Cambridge University Press, 2008

**E REFERENCES**

1. NPTEL, Data structures and algorithm ,Prof. Hema A Murthy,IITMadras,Prof. Shankar Balachandran,IITMadras,Dr. N S. Narayanaswamy,IIT Madras
2. NPTEL, Data structures and algorithm ,Prof. Naveen Garg,IIT Delhi

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 8	PSO 9
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	3	3	2	2	2	1	2	2	3	2
CO 5	3	2	2	2	2	1	2	2	3	2
Total	15	13	10	10	10	5	10	10	15	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

**YCA205 – ADVANCED OPERATING SYSTEM CONCEPTS LAB****Course Outcomes:**

CO1 P Guided Response      *Practice the basic scheduling algorithms*

- CO2 A Apply *Understand* and apply algorithms to avoid dead lock  
 CO3 P Guided Response *Practice the* various page replacement algorithms  
 CO4 A Apply *Apply* the algorithms for optimal page replacement  
 CO5 A Apply *Apply* the linear, non-linear and sorting algorithms

Course Code	Course Name	L	T	P	C
YCA205	Advanced Operating System Concepts Lab	0	0	4	2
C:P:A = 0:1:1		L	T	P	H
		0	0	4	4
					60

1. Simulate the FCFS - CPU Scheduling Algorithms
2. Simulate the SJF - CPU Scheduling Algorithms.
3. Simulate the Priority - CPU Scheduling Algorithms.
4. Simulate the Round Robin - CPU Scheduling Algorithms
5. Simulate MVT and MFT
6. Simulate Bankers algorithm for Deadlock Avoidance
7. Simulate FIFO Page Replacement Algorithms
8. Simulate LRU Page Replacement Algorithms
9. Simulate Optimal Page Replacement Algorithms
10. Implement linear and nonlinear data structures to solve real-time problems
11. Perform searching and sorting techniques of data structures to different application domains

	LECTURE	PRACTICAL	TOTAL
	0	60	60

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA206- CASE TOOLS LAB

#### Course Outcomes:

- CO1 P Guided Response *Manipulate* various methods to define CASE tools  
 CO2 P Set *Developing* Relational databases

CO3 P Guided *Describe* and *implement* various Application development tools  
Response

CO4 P Set *Describe* and *solve* problems in developing application software

CO5 P Guided *Developing* Management tools  
Response

Course Code	Course Name	L	T	P	C
YCA206	Case Tools Lab	0	0	4	2
<b>C:P:A = 0:2:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
					<b>60</b>

The lab sessions will have experiments on the following:

1. Use of diagramming tools for system analysis, such as Turbo analyst, for preparing Data Flow diagrams and E-R diagrams.
2. Use of tools for relational database design such as relational Designer.
3. Identify Use Cases and develop the Use Case model.
4. Identify the conceptual classes and develop a domain model with UML Class diagram
5. Draw relevant state charts and activity diagrams.
6. Use of toots such as Power Builder, Delphi, Magic etc. in developing application software including interactive data-entry screens,
7. Transaction processing
8. Report Generations, etc.
9. Use of tools for managing the process of software development such as Source Code Control System (SCCS).
10. Revision Control System (RCS), Make etc.

### References

Products manuals from concerned vendors

Keminghan, B.W., Pike, R., '6'fbe Unix Programming Environment", Prentice Hall of India,

New Delhi, 1984.

	LECTURE	PRACTICAL	TOTAL
	<b>0</b>	<b>60</b>	<b>60</b>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2

CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA301-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

#### Course Outcomes:

CO1	C	Knowledge	<i>Describe</i> various methods to define AI techniques
CO2	C	Understand	<i>Understand</i> and apply set theory and Relations
CO3	C	Knowledge	<i>Describe</i> and <i>apply</i> various counting and Predicate Logic
CO4	C	Understand	<i>Describe</i> and <i>solve</i> problems in Probabilistic reasoning
CO5	C	Understand	<i>Understand</i> Concept of learning the expert systems

COURSE CODE	COURSE NAME	L	T	P	C
YCA301	Artificial Intelligence and Machine Learning	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
		4	0	0	4
<b>UNIT –I: AI Techniques</b>					<b>12</b>
AI techniques-search knowledge, abstraction- natural language processing- vision and speech processing- Games-theorem proving- robotics - expert systems.					
<b>UNIT -II : State Space Search</b>					<b>12</b>
State space search: Production systems- Search space control: Depth first, breadth first search, heuristic search - Hill climbing - best first search - branch and bound.					
<b>UNIT- III: Predicate Logic</b>					<b>12</b>
Minimax search: Alpha-Beta cut offs- Predicate Logic : Skolemizing queries - Unification. Modus pone - Resolution - dependency directed backtracking					
<b>UNIT- IV: Backtracking</b>					<b>12</b>



Rule Based Systems-Forward reasoning-Conflict resolution-Backward reasoning-  
 Use of no backtrack-Structured Knowledge Representations- Semantic Net-slots, exceptions  
 and defaults Frames- Probabilistic reasoning-Use of certainty factors-Fuzzy logic.

**UNIT- V: Expert Systems** **12**

Concept of learning-learning automation-genetic algorithm- learning by induction-neural  
 netsback propagation-Need and justification for expert systems- Knowledge acquisition-  
 Case studies: MYCIN, RI.

LECTURE	TUTORIAL	TOTAL
60	0	60

**TEXT**

1. Stuart J.Russell and Peter Norvig., "Artificial Intelligence- A Modern Approach",  
 Pearson-3<sup>rd</sup> edition, 2010.

**REFERENCES**

1. Nilsson, N.J., "Principles of AP", Narosa Publishing House, 1990.
2. Patterson, D. W., "Introduction to AI and Expert Systems", Prentice Hall of India,  
 1992.
3. Peter Jackson, "Introduction to Expert Systems", Addison Wesley Publishing  
 Company, M.A., 1992
4. Rich, E., and Knight, K., "Artificial Intelligence", Tata McGraw Hill (2nd Edition), 1992.
5. Schalk off, R.J., "Artificial Intelligence • An Engineering Approach", McGraw Hill  
 International Edition, Singapore, 1992.
6. Sasikumar, M., Ramani, S., "Rule Based Expert System", Narosa Publishing  
 House,1994.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	2	2	2	2	1	2	2	3	3
CO 4	2	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	14	13	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCA302-GRAPHICS AND MULTIMEDIA

**Course Outcomes:**

- CO1 C Knowledge *Describe* various methods to define line-drawing algorithms
- CO2 C Understand *Understand* and apply 2d and 3d transformations
- CO3 C Knowledge *Describe* and *apply* various types multimedia applications
- CO4 C Understand *Describe* and *solve* problems in development tools
- CO5 C Understand *Understand* hypermedia

COURSE CODE	COURSE NAME	L	T	P	C
YCA302	Graphics and Multimedia	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT -I : OUTPUT PRIMITIVES</b>					<b>09</b>
Points and lines – Line-drawing algorithms – DDA algorithm – Bresenham’s line algorithm – Attributes of output primitives: Line attributes – Area-fill attributes – Character attributes – Bundled attributes					
<b>UNIT- II: 2D AND 3D TRANSFORMATIONS</b>					<b>09</b>
Two-dimensional Geometric transformations: Basic transformations – Matrix representations – Composite transformations – Three-Dimensional object representations – Three-Dimensional geometric and modeling transformations – Three-Dimensional viewing – Hidden surface elimination – Color models – Virtual reality – Animation					
<b>UNIT- III: MUTLIMEDIA</b>					<b>09</b>
Multimedia basics – Multimedia applications – Multimedia system architecture – Evolving technologies for multimedia – Defining objects for multimedia systems – Multimedia data interface standards – Multimedia databases					
<b>UNIT- IV: MULTIMEDIA</b>					<b>09</b>
Technology: Development Tools – Image – Audio – Video- Compression and decompression – Data and file format standards – Multimedia I/O technologies – Digital voice and audio – Video image and animation – Full motion video – Storage and retrieval technologies					

**UNIT- V: HYPERMEDIA****09**

Multimedia authoring and user interface – Hypermedia messaging – Mobile messaging – Hypermedia message component – Creating hypermedia message – Integrated multimedia message standards – Integrated document management – Distributed multimedia systems

LECTURE	TUTORIAL	TOTAL
45	0	45

**TEXT**

4. Donald Hearn and M.Pauline Baker, Computer Graphics in C Version, Fifth Edition, Pearson Education, 2015.
5. Andleigh, P. K and Kiran Thakrar , Multimedia Systems and Design, PHI, 2003.
6. Judith Jeffcoate , Multimedia in Practice: Technology and Practice., Pearson Education, 2014

**REFERENCES**

3. William M. Neuman, Robert R. Sprout, Principles of interactive Computer Graphics, McGraw Hill International Edition.
4. Buford J. F Koegel, Multimedia Systems, Twelfth Indian Reprint, Pearson Education

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	3	3	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	3	2	2	2	1	2	2	3	3
CO 4	3	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	15	14	11	11	11	5	10	10	13	13
Course	3	3	3	3	3	1	1	1	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

**YCA303- OPTIMIZATION TECHNIQUES****Course Outcomes:**

- |     |   |            |   |
|-----|---|------------|---|
| CO1 | C | Knowledge  | <i>Describe</i> various methods to define simplex method      |
| CO2 | C | Understand | <i>Understand</i> and apply branch and bound method.          |
| CO3 | C | Knowledge  | <i>Describe</i> and <i>apply</i> various queuing theory       |
| CO4 | C | Understand | <i>Describe</i> and <i>solve</i> problems in inventory theory |
| CO5 | C | Understand | <i>Understand</i> PERT and CPM path.                          |

<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
YCA303	<b>Optimization Techniques Linear Programming</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>C:P:A = 4:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>UNIT- I: Introduction to Optimization Techniques</b>					<b>12</b>
Graphical method for two dimensional problems - Central problem of linear programming various definitions - statements of basic theorems and properties - Phase I and Phase II of the simplex method - revised simplex method - primal and dual - dual simplex method.					
<b>UNIT- II: Integer Programming</b>					<b>12</b>
Sensitivity analysis transportation problem and its solution - assignment problem and its solution by Hungarian method- Gomorra cutting plane methods - Branch and Bound method					
<b>UNIT- III: Queuing Theory</b>					<b>12</b>
Characteristics of queuing systems - steady state Mimi, MIMit/K and MIMIC queuing models- Replacement of items that deteriorate - Replacement of items that fail Group replacement and individual replacement.					
<b>UNIT- IV: Inventory Theory</b>					<b>12</b>
Costs involved in inventory problems - single item deterministic models-economic lot size models without shortages and with shortages having production rate infinite and finite.					
<b>UNIT- V: PERT and CPM</b>					<b>12</b>
Arrow networks - time estimates- earliest expected time, latest allowable occurrence time and slack - critical path - probability of meeting scheduled date of completion of project- calculations on CPM network - various floats for activities - critical path - updating project - operation time cost trade off curve - project time cost trade off curve - selection of schedule based on cost analysis.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>60</b>	<b>0</b>	<b>60</b>	
<b>TEXT</b>					
1. Hamdy A.TAHA., "Operations research- An Introduction", 8 <sup>th</sup> edition, Pearson Education, Inc, 2007.					
<b>REFERENCES</b>					

1. Karnbo, N.S., "Mathematical Programming Techniques", McGraw Hill, New York. 1985.
2. Kanti Swarup, Gupta, P.K., and Man Mohan, "Operations Research", Sultan Chand & Sons-New Delhi. 1990.
3. Mital K. V., "Optimization Methods In Operations Research and System Analysis", New Age International (P) Ltd., New Delhi, 1992.
4. Saffer, L.R., Fitter J.B., and MeyerW.L., "The Critical Path Method". McGraw Hill. New York. 1990.
5. Taha, H.A., "Operations research- An Introduction", McMillan Publishing co .• New York, 1986.
6. Gillet, B.E., "Introduction to Operations Research : A Computer Oriented Algorithmic Approach". Tata McGraw Hill, New York, 1990.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	2	2	2	2	2	1	1	1	2	2
CO 5	3	2	2	2	2	1	1	1	2	2
Total	13	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### **YCA304- ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LAB**

#### **Course Outcomes:**

- CO1 P Guided Response **Manipulate** various methods to define AI techniques
- CO2 P Set **Starts** and apply set theory and Relations
- CO3 P Guided Response **Develop** and **implement** various counting and Predicate Logic
- CO4 P Guided Response **Develop** and **solve** problems in Probabilistic reasoning
- CO5 P Set **Build** Concept of learning the expert systems

COURSE CODE	COURSE NAME		L	T	P	C				
YCA304	Artificial Intelligence and Machine Learning Lab		0	0	3	2				
<b>C:P:A = 0:2:0</b>										
			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>				
			<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>				
						<b>45</b>				
1. Switches, Lights, and Multiplexers 2. Numbers and Displays 3. Latches, Flip-flops, and Registers 4. Counters 5. Timers and Real-Time Clock 6. Adders, Subtractors, and Multipliers 7. Finite State Machines 8. Memory Blocks 9. A Simple Processor 10. An Enhanced Processor										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10

Course	3	2	2	1	2	2	2	2	3	3
0-No relation 3- Highly relation 2- Medium relation 1- Low relation										

### YCA305-OPTIMIZATION TECHNIQUES LAB

#### Course Outcomes:

- CO1 P Guided Response *Manipulate* various methods to define simplex method
- CO2 P Set *Starts* and apply branch and bound method.
- CO3 P Guided Response *Develop* and *implement* various queuing theory
- CO4 P Guided Response *Develop* and *solve* problems in inventory theory

COURSE CODE	COURSE NAME	L	T	P	C
YCA305	Optimization Techniques Lab	0	0	4	2
<b>C:P:A = 0:2:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>
					<b>60</b>

To develop computer programs for the following and to test with suitable numerical examples

- Graphical method to solve two dimensional Linear Programming Problem.
- Revised Simplex method to solve n-dimensional Linear Programming Problem
- Dual Simplex method to solve n-dimensional Linear Programming Problem.
- Solution of Transportation problem.
- Gomory cutting plane methods for Integer Programming Problems
- Branch and Bound method to solve Integer Programming Problem.
- M/M/1/N AND M/M/C queuing problems.
- Single item deterministic inventory model problems with/without shortage and finite/infinite production rate.
- To draw the PERT/CPM networks.
- Calculations of PERT analysis
- Calculation of CPM analysis.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	2	2
CO 2	2	1	1	1	1	1	1	1	2	2
CO 3	2	1	2	1	1	2	2	1	2	2
CO 4	2	2	1	1	2	1	1	2	2	2
CO 5	1	1	1	1	1	1	1	1	2	2
Total	09	06	06	05	06	06	06	06	10	10
Course	3	2	2	1	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

COURSECODE	COURSE NAME	L	T	P	C
<b>YCA306</b>	<b>Industrials Lectures</b>	0	0	2	2
<b>C:P:A = 0:2:0</b>					
		L	T	P	H
		0	0	2	2

CO1 P Guided Response Identifying the Recent Technologies

CO2 P Guided Response Preparing the content/Arranging the Seminar

CO3 P Guided Response Attending the Lectures

CO4 P Guided Response Implementing the Lectures

CO5 P Guided Response Answer the Question

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
<b>CO 1</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 2</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 3</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 4</b>	2	2	2	2	2	2	2	2	3	3



<b>CO 5</b>	2	2	2	2	2	2	2	2	3	3
<b>Total</b>	10	10	10	10	10	10	10	10	15	15
<b>Course</b>	3	2	2	2	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

<b>COURSECODE</b>	<b>COURSE NAME</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>YCA307</b>	<b>Mini Project</b>	0	0	3	2
<b>C:P:A = 0:2:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		0	0	3	3

CO1 P Guided Response Practice the Requirements Analysis

CO2 P Guided Response Create the Design for their project

CO3 P Guided Response Create the Coding

CO4 P Guided Response Plan for Testing

CO5 P Guided Response Solve the Conclusion

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO 1</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 2</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 3</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 4</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 5</b>	2	2	2	2	2	2	2	2	3	3
<b>Total</b>	10	10	10	10	10	10	10	10	15	15
<b>Course</b>	3	2	2	2	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

<b>COURSECODE</b>	<b>COURSE NAME</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>YCA401</b>	Research Methodology(Paper Publications)	0	0	3	3
<b>C:P:A = 0:3:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		0	0	3	3

- CO1 P Guided Response Identifying the Topic
- CO2 P Guided Response Preparing the content/Arranging the Seminar
- CO3 P Guided Response Presenting the content
- CO4 P Guided Response Addressing the Audience
- CO5 P Guided Response Answer the Question

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO 1</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 2</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 3</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 4</b>	2	2	2	2	2	2	2	2	3	3
<b>CO 5</b>	2	2	2	2	2	2	2	2	3	3
<b>Total</b>	10	10	10	10	10	10	10	10	15	15
<b>Course</b>	3	2	2	2	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

COURSECODE	COURSE NAME	L	T	P	C
YCA402	Project Work	0	0	6	12
C:P:A = 0:3:2					
		L	T	P	H
		0	0	6	6

- CO1 P Guided Response Practice the Requirements Analysis
- CO2 P Guided Response Develop the Design of the project
- CO3 P Guided Response Create the Coding
- CO4 P Guided Response Plan for Testing
- CO5 P Guided Response Solve the problem and Write Conclusion

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	2	2	2	2	2	2	3	3
CO 2	2	2	2	2	2	2	2	2	3	3
CO 3	2	2	2	2	2	2	2	2	3	3
CO 4	2	2	2	2	2	2	2	2	3	3
CO 5	2	2	2	2	2	2	2	2	3	3
Total	10	10	10	10	10	10	10	10	15	15
Course	3	2	2	2	2	2	2	2	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

## YCAEE1 DATA MINING AND DATA WAREHOUSING

### Course Outcomes:

- CO1 C Understand *Explain* the concepts of data mining
- CO2 C Understand *Describe* and *implement* the concept of association rule mining

CO3	C	Understand	<i>Describe</i> and <i>implement</i> the concept of classification and clustering the datasets .
CO4	C	Understand	<i>Describe</i> and <i>implement</i> various types data warehouse tools
CO5	C	Understand	<i>illustrate</i> the different types of mining concepts and its applications

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE1	DATA MINING AND DATA WAREHOUSING	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
		4	0	0	4
<b>UNIT I FUNDAMENTALS</b>					<b>12</b>
Fundamentals of Statistics – Databases – Data Mining Functionalities – Steps in Data Mining Process– Architecture of a typical Data Mining Systems – Classification of Data Mining Systems –Overview of Data Mining Techniques-Major issues in data mining.					
<b>UNIT II DATA PREPROCESSING AND ASSOCIATION RULES</b>					<b>12</b>
Data Pre-processing: Data Cleaning– Data Integration– Data Transformation – Data Reduction– Concept Hierarchies – Concept Description- Data Generalization - Data Summarization- Data Characterization– Mining Association Rules in Large Databases.					
<b>UNIT III PREDICTIVE MODELING</b>					<b>12</b>
Classification and Prediction Issues Regarding Classification and Prediction–Classification by Decision Tree Induction – Bayesian Classification – Other Classification Methods – Prediction – Clusters Analysis Types of Data in Cluster Analysis – Categorization of Major Clustering Methods Partitioning Methods – Hierarchical Methods					
<b>UNIT IV DATA WAREHOUSING</b>					<b>12</b>
Data Warehousing Components – Multi Dimensional Data Model – Data Warehouse Architecture – Data Warehouse Implementation – Mapping the Data Warehouse to Multiprocessor Architecture – OLAP – Need – Categorization of OLAP Tools.					
<b>UNIT V APPLICATIONS</b>					<b>12</b>
Applications of Data Mining – Social Impacts of Data Mining – Tools – An Introduction to DB Miner – Case Studies – Mining WWW – Mining Text Database – Mining Spatial Databases.					
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>	
	<b>60</b>	<b>-</b>	<b>-</b>	<b>60</b>	
<b>TEXT</b>					
1. Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, Morgan Kaufmann Publishers, 2002.					
<b>REFERENCES</b>					
1. Alex Berson and Stephen J. Smith, Data Warehousing- Data Mining & OLAP, TMH, 2011.					
2. Usama M.Fayyad et. Al., Advances in Knowledge Discovery and Data Mining, The M.I.T Press, 2009.					
3. Ralph Kimball, The Data Warehouse Life Cycle Toolkit, John Wiley & Sons Inc., 2008.					
<b>E REFERENCES</b>					
1. <a href="https://www.tacoma.uw.edu/sites/default/files/sections/InstituteTechnology/TCSS555_DataMining.pdf">https://www.tacoma.uw.edu/sites/default/files/sections/InstituteTechnology/TCSS555_DataMining.pdf</a>					

2. [http://www.kdnuggets.com/data\\_mining\\_course/syllabus.html](http://www.kdnuggets.com/data_mining_course/syllabus.html)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	0	1	0	2	0	0	1	3
CO 2	3	2	1	1	0	0	2	0	1	2
CO 3	2	2	1	2	0	0	2	0	0	2
CO 4	2	0	2	1	0	0	2	0	2	2
CO 5	2	0	2	2	0	0	0	0	2	2
Total	12	6	6	7	0	2	6	0	6	11
Course	3	2	2	2	0	1	2	0	2	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

## YCAEE2 HIGH PERFORMANCE COMPUTING

### Course Outcomes:

CO1	C	Understand	<i>Explain</i> the concepts of processors and models
CO2	C	Understand	<i>Describe</i> the architecture and memory design
CO3	C	Understand	<i>Describe</i> the design issues in parallel computing.
CO4	C	Understand	<i>Describe</i> the limitations of parallel computing and power aware techniques
CO5	C	Understand	<i>illustrate</i> the different types of advanced concepts

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE2	HIGH PERFORMANCE COMPUTING	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
		4	0	0	4
<b>UNIT I CONCEPTS</b>					<b>12</b>
Parallel Processing Concept :Levels of parallelism (instruction, transaction, task, thread, memory, function)- Models (SIMD, MIMD, SIMT, SPMD, Dataflow Models, Demand-driven Computation etc)- Architectures: N-wide superscalar architectures, multi-core, multi-threaded					
<b>UNIT IIPARALLEL PROGRAMMING WITH CUDA</b>					<b>12</b>
Parallel Programming with CUDA : Processor Architecture, Interconnect, Communication, Memory Organization, and Programming Models in high performance computing architectures: (Examples: IBM CELL BE, Nvidia Tesla GPU, Intel Larrabee Micro-architecture and Intel Nehalem micro - architecture- Memory hierarchy and transaction specific memory design- Thread Organization					
<b>UNIT IIIISSUES</b>					<b>12</b>

Fundamental Design Issues in Parallel Computing : Synchronization- Scheduling- Job Allocation- Job Partitioning- Dependency Analysis- Mapping Parallel Algorithms onto Parallel Architectures- Performance Analysis of Parallel Algorithms

**UNIT IV LIMITATIONS** **12**

Fundamental Limitations Facing Parallel Computing and power aware techniques : Bandwidth Limitations- Latency Limitations- Latency Hiding/Tolerating Techniques and their limitations- Power- aware Processing Techniques-Power-aware Memory Design- Power-aware Interconnect Design- Software Power Management.

**UNIT V ADVANCED TOPICS** **12**

Petascale Computing-Optics in Parallel Computing- Quantum Computers- Recent developments in Nanotechnology and its impact on HPC

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	<b>60</b>	-	-	<b>60</b>

**TEXT**

1. George S. Almasi and Alan Gottlieb, Highly Parallel Computing, Benjamin Cumming Publishers.
2. Kai Hwang ,Advanced Computer Architecture: Parallelism, Scalability, Programmability, McGraw Hill 1993
3. David Culler, Jaswinder Pal Singh, Anoop Gupta, Parallel Computer Architecture: A hardware/Software Approach, Morgan Kaufmann, 1999.
4. K. Hwang & Z. Xu, Scalable Parallel Computing – Technology, Architecture, Programming., McGraw Hill 1998.

**REFERENCES**

1. William James Dally and Brian Towles, Principles and Practices on Interconnection Networks, Morgan Kauffman 2004.
2. Hubert Nguyen , GPU Gems 3, Addison Wesley, 2008, (Chapter 29 to Chapter 41).
3. Ananth Grama, Anshul Gupta, George Karypis, and Vipin Kumar, Introduction to Parallel Computing, , 2nd edition, Pearson, 2003.
4. David A. Bader (Ed.), Petascale Computing: Algorithms and Applications, Chapman & Hall/CRC, 2008

**E REFERENCES**

1. <https://nptel.ac.in/courses/106/108/106108055/>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	0	1	0	2	0	0	1	3
CO 2	3	2	1	1	0	0	2	0	1	2
CO 3	2	2	1	2	0	0	2	0	0	2
CO 4	2	0	2	1	0	0	2	0	2	2
CO 5	2	0	2	2	0	0	0	0	2	2
Total	12	6	6	7	0	2	6	0	6	11
Course	3	2	2	2	0	1	2	0	2	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

**YCAEE3-COMPILER DESIGN**

**Course Outcomes:**

Domain	Level	Course Outcomes
CO1	C	Understand <i>Explain</i> the concept of Compiler designing
CO2	C	Understand <i>Understand</i> the concept of parser Theory
CO3	C	Understand <i>Understand</i> the concept syntax analysis
CO4	C	Understand <i>Understand</i> the handling techniques
CO5	C	Understand <i>Understand</i> the code generation

Course Code	Course Name	L	T	P	C
YCAEE3	Compiler Design	4	0	0	4
C:P:A = 4:0:0					
		L	T	P	H
		4	0	0	4
<b>UNIT- I : Introduction</b>					<b>12</b>
Classification of grammars. Context free grammars. Deterministic finite state automata (DFA) Non-DFA.					
<b>UNIT- II: Parsing Theory- Syntax Analyzer</b>					<b>12</b>
Scanners. Top down parsing, LL grammars. Bottom up parsing. Polish expressions Operator precedence grammar. IR grammars. comparison of parsing methods. Error handling.					
<b>UNIT- III: Runtime Environment</b>					<b>12</b>
Symbol table handling techniques. Organization for non-block and block structured languages. Run time storage administration. Static and dynamic allocation.					
<b>UNIT- IV: Syntax Analysis</b>					<b>12</b>
Intermediate forms of source program. Polish N-tuple and syntax trees. Semantic analysis and code generation.					
<b>UNIT- V: Code Optimization and Code Generation</b>					<b>12</b>
Code optimization. Folding, redundant sub-expression evaluation. Optimization within iterative loops.					
		LECTURE	TUTORIAL	TOTAL	
		60	-	60	
<b>TEXT Books</b>					
1. Murray, et.al "The Visual C++ Handbook", 2nd edition. Osborne McGraw Hill. New York. 1996.					

## REFERENCES

1. Tremblay, et. al, "The Theory and Practice of Compiler Writing". McGraw Hill, New York,
2. Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers Elsevier Science, 2004.
3. Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

## YCAEE8    SYSTEM ANALYSIS AND SIMULATION

### Course Outcomes:

CO1	C	Knowledge	<i>Define</i> Role of modeling
CO2	C	Understand	<i>Describe</i> Generation of Pseudo-Random Numbers
CO3	C	Knowledge	<i>Outline</i> the simulating queuing systems
CO4	C	Knowledge	<i>Describe</i> Simulation of Systems
CO5	C	Understand	<i>Understand</i> Cases on Simulation

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE8	System Analysis and Simulation	4	0	0	4



<b>C:P:A =4:0:0</b>											
						<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>		
						<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>		
<b>UNIT- I : (Systems Analysis)</b>									<b>12</b>		
Role of Modeling in Systems Analysis: Computer Simulation of Stochastic Systems';											
<b>UNIT- II: (Simulation of Queuing Systems)</b>									<b>12</b>		
Generation of Pseudo-Random Numbers- and Stochastic Variates using the computer; - Simulation of Queuing Systems											
<b>UNIT -III: (Simulation Languages)</b>									<b>12</b>		
Using special purpose languages for simulating queuing systems- GPSS and/or SLAM- System Dynamics											
<b>UNIT- IV: (System Dynamics with Dynamo)</b>									<b>12</b>		
Simulation of Systems with Feedback; using DYNAMO in System Dynamics;											
<b>UNIT -V :(Simulation on Business)</b>									<b>12</b>		
Cases on Simulation in Production-Finance, Marketing, and Corporate Planning; Project Work											
						<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>			
						<b>60</b>	<b>0</b>	<b>60</b>			
<b>TEXT</b>											
1. Kamal, Raj, Embedded Systems: Architecture, Programming & Design, Tata McGraw Hill, 2ndEd.,2008											
2.Jerry Banks, John S. Carson, Barry L. Nelson, David M. Nicol “Discrete – Event system simulation”, Pearson education.											
<b>REFERENCES</b>											
1 Banks, J., Catson, S., Nelson, B.L., "Discrete-Event System Simulation", (2nd Edition). Prentice Hall of India, N. Delhi, 1996.											
2. Deo, N., "System Simulation with Digital Computers". Prentice Hall of India, 1979.											
Law, A.M., and Kelton, W.D., "Simulation Modelling and Analysis", (2nd Edition). McGraw Hill, N. Y, 1991.											

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2

CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

## YCAEE9 CRYPTOGRAPHY AND INFORMATION SECURITY

### Course Outcomes:

CO1	U	Understand	<i>Understand</i> the overview of the cryptography basics model.
CO2	U	Understand	<i>Describe</i> the idea of cryptography algorithm
CO3	K	Knowledge	<i>Analyze</i> various security technology
CO4	K	Knowledge	<i>Describe</i> intrusion detection and prevention
CO5	U	Understand	<i>Understand</i> the implementation of security and change management

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE9	CRYPTOGRAPHY AND INFORMATION SECURITY	4	0	0	4
<b>C:P:A 4:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>
<b>UNIT I OVERVIEW</b>					<b>12</b>
Services, Mechanisms and Attacks, The OSI Security Architecture, A Model for Network Security. <b>Classical Encryption Techniques:</b> Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Steganography					
<b>UNIT II ALGORITHMS</b>					<b>12</b>
Simplified DES- Key Management, Diffe-Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.					
<b>UNIT III PLANNING FOR SECURITY</b>					<b>12</b>
Information Security Planning and Governance-Information Security Policy, Standards, and Practices -The Information Security Blueprint -Security Education, Training, and Awareness Program -Continuity Strategies.					
<b>UNIT IV FIREWALLS AND VPNS</b>					<b>12</b>

Access Control -Firewalls -Firewall Processing Modes -Firewalls Categorized by Generation -Firewalls Categorized by Structure-Firewall Architectures -Selecting the Right Firewall - Configuring and Managing Firewalls-Content Filters -Protecting Remote Connections - Remote Access -Virtual Private Networks .

**UNIT V INTRUSION DETECTION AND PREVENTION SYSTEMS** **12**

Introduction-Intrusion Detection and Prevention Systems - Types of IDPS- IDPS Detection Methods- IDPS Response Behavior- Selecting IDPS Approaches and Products- Strengths and Limitations of IDPSs- Deployment and Implementation of an IDPS-Measuring the Effectiveness of IDPSs

	LECTURE	TUTORIAL	TOTAL
	<b>60</b>	<b>-</b>	<b>60</b>

**TEXT**

1. Michael E. Whitman, and Herbert J. Mattord, Principles of Information Security 4th edition, Cengage Learning 2012.
2. Cryptography and Network Security Third Edition William Stallings, Prentice Hall, 2002

**REFERENCES**

1. Nozaki, Micki Krause, Tipton, Harold F, Information Security Management Handbook - 6<sup>th</sup> Edition CRC Press, 2012
2. Hossein Bidgoli, Handbook of Information Security-Information Warfare; Social, Legal, and International Issues; and Security Foundations, John Wiley & Sons Inc. 2006

**E REFERENCES**

1. [https://onlinecourses.nptel.ac.in/noc15\\_cs03](https://onlinecourses.nptel.ac.in/noc15_cs03)
2. [https://onlinecourses.nptel.ac.in/noc16\\_cs01](https://onlinecourses.nptel.ac.in/noc16_cs01)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	2	0	2	1	2	1	1	3	0
CO 2	3	1	0	2	1	2	1	1	3	1
CO 3	3	2	0	2	1	1	1	1	3	1
CO 4	3	2	0	2	1	2	1	1	3	0
CO 5	3	2	0	2	1	2	1	1	3	1
Total	15	9	0	10	5	9	5	5	15	3
Course	3	2	0	2	1	2	1	1	3	1

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

**YCAEE4 CLOUD COMPUTING**

**Course Outcomes:**

- |     |   |            |   |
|-----|---|------------|---|
| CO1 | C | Knowledge  | <i>Characterize</i> the concept of Cloud Computing                                      |
| CO2 | C | Understand | <i>Identify</i> the architecture, infrastructure and delivery models of cloud computing |
| CO3 | C | Knowledge  | <i>Classify</i> various Cloud services  |

CO4 C Understand *Choose* the appropriate Programming Models and approach  
 CO5 C Remember *Identifies* different applications in Cloud

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE4	CLoud COMPUTING	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3
<b>UNIT I CLOUD COMPUTING FOUNDATION</b>					<b>09</b>
Introduction to Cloud Computing- Move to Cloud Computing-Types of Cloud-working of Cloud computing- Cloud Computing Technology.					
<b>UNIT II DATA STORAGE AND VIRTUALIZATION</b>					<b>09</b>
Data Storage-Cloud Storage- Cloud Computing frameworks-Google,EMC,Amazon and Salesforce.com. Virtualization - Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource Management – Virtualization for Data-center Automation.					
<b>UNIT III CLOUD SERVICES AND PROGRAMMING MODELS</b>					<b>09</b>
Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service(IaaS) Parallel and Distributed Programming Paradigms – MapReduce, Twister and Iterative MapReduce – Hadoop Library from Apache					
<b>UNIT IV CLOUD COMPUTING TOOLS AND TECHNOLOGIES</b>					<b>09</b>
Grid, Cloud and Virtualization-Cloud Computing Application Platform – Tools for building cloud- Map Reduce Paradigms: Introduction, GFS Architecture, HDFS Architecture, Hbase, Google big Table, Amazon’s (key value) pair storage and Microsoft’s Azure infrastructure, Map reduce programming examples					
<b>UNIT V CLOUD APPLICATIONS</b>					<b>09</b>
Google Cloud Applications-Google App Engine-Case Study: Cloud as Infrastructure for an internet-Case Study-An Enterprise with Multiple Data Centers.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>45</b>	<b>0</b>	<b>45</b>	
<b>TEXT</b>					
1. A.Srinivasan, J. Suresh , Cloud Computing – A Practical Approach for learning and Implementation, , Pearson Education, 2014.					
<b>REFERENCES</b>					
1. Syed A.Ahson, Mohammad Ilyas, Cloud Computing and Software Services-Theory and Techniques, CRC, 2011.					
2. Anthony T. Velte Toby J. Velte, Ph.D. Robert Elsenpeter, Cloud Computing-A Practical Approach, The McGraw-Hill, 2010					
3. George Reese, “Cloud Application Architectures: Building Applications and Infrastructure in the Cloud” O’Reilly					
<b>E REFERENCES</b>					
1. <a href="http://track.justcloud.com/?hash=7397">http://track.justcloud.com/?hash=7397</a> .					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	3	3	3	2	2	2	1	1	2	2

CO 2	3	3	3	2	2	2	1	1	2	2
CO 3	3	3	3	2	2	2	1	1	2	2
CO 4	3	3	3	2	2	2	1	1	2	2
CO 5	2	2	2	2	2	2	1	1	2	2
Total	14	14	14	10	10	10	5	5	10	10
Course	3	3	3	2	2	2	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### YCAEE5 - DISTRIBUTED DATABASE MANAGEMENT

#### Course Outcomes:

- CO1 C Knowledge    *Describe* various methods to define levels of distributed database design
- CO2 C Understand    *Understand* and apply time based and quorum based protocols
- CO3 C Knowledge    *Describe* and *apply* various types of protocols
- CO4 C Understand    *Describe* and *solve* problems in distributed data dictionary management
- CO5 C Understand    *Understand* SQL server

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE5	Distributed Database Management	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		L	T	P	H
		3	0	0	3
<b>UNIT- I :Distributed Database Design</b>					<b>09</b>
Distributed DBMS features and needs - Reference architecture- Levels of distribution transparency, replication- Distributed database design - fragmentation, allocation criteria- Storage mechanisms.					
<b>UNIT- II:Global Query Optimization</b>					<b>09</b>
Translation of global queries /Global query optimization- Query execution and access plan- Concurrency control - 2 phase locks- Distributed deadlocks- Time based and quorum based protocols- Comparison					
<b>UNIT- III: Types of Protocols</b>					<b>09</b>

Reliability - non-blocking commitment protocols-Partitioned networks-Checkpoints and cold starts-Management of distributed transactions - 2 phase unit protocols- Architectural aspects.

**UNIT- IV: Distributed Data Dictionary Management** **09**

Node and link failure recoveries-Distributed data dictionary management- Distributed database administration.-Heterogeneous databases-federated database, reference architecture, loosely and tightly coupled.

**UNIT- V: SQL Server** **09**

Alternative architectures- Development tasks, Operation - global task management-Client server databases-SQL server, open database connectivity- Constructing an application.

LECTURE	TUTORIAL	TOTAL
45	0	45

**TEXT**

1. Elim asri.navathe- “Fundamentals of Database Management Systems”- 6<sup>th</sup> edition ,Addison Welsey.
2. M.Tamer Ozsu,Patrick valduriez “principles of distributed database systems ”- 3<sup>rd</sup>edition ,Springer science +Business Media ,LLC 2011.

**REFERENCES**

1. Ceri, S .. Pe1agatti. G., "Distributed Databases: Principles and System', McGraw Hill. New York, 1985.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	2	2	3	3
CO 2	3	3	2	2	2	1	2	2	3	3
CO 3	3	3	2	2	2	1	2	2	3	3
CO 4	3	3	2	2	2	1	2	2	2	2
CO 5	3	2	2	2	2	1	2	2	2	2
Total	15	14	10	10	10	5	10	10	13	13
Course	3	3	2	2	2	1	1	1	3	3

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

## YCAEE6 – IMAGE PROCESSING

### Course Outcomes:

	Domain	Level	
CO 1	Cognitive	Understand	<i>Describe</i> the basics of digital image fundamentals.
CO 2	Cognitive	Knowledge	<i>Understand</i> the classifications of Image Processing techniques.
CO 3	Cognitive	Knowledge Apply	<i>Describe</i> and <i>apply</i> various types of feature extraction techniques applicable for image vision.
CO 4	Cognitive	Understand Apply	<i>Describe</i> and <i>solve</i> problems in encoding images based on the concept of Fourier transforms.
CO 5	Cognitive	Knowledge	<i>Define</i> the concept of filtering and Restorations.

Course Code	Course Name	L	T	P	C
YCAEE6	Image Processing	3	0	0	3
C:P:A = 3:0:0		L	T	P	H
		3	0	0	3
<b>UNIT –I: Digital Image Fundamentals</b>					<b>9</b>
Image digital Representation. Elements of visual perception .Sampling and quantization. Image processing system elements. Fourier transforms. Extension to 2- D, OCR, Walsh, Hadamard transforms.					
<b>UNIT- II: Image Transformation and segmentation</b>					<b>9</b>
Enhancement and segmentation: Histogram modification. Smoothing, sharpening.					
<b>UNIT – III: Feature Extraction</b>					<b>9</b>
Thresholding - Edge Detection. Segmentation. Point and region dependent techniques.					
<b>UNIT -IV : Image Encoding</b>					<b>9</b>
Image encoding: Fidelity criteria. Transform compression. KL, Fourier, DCT. Spatial compression, Run length coding. Huffman and contour coding.					
<b>UNIT- V : Image Restoration</b>					<b>9</b>
Restoration: Models. Inverse filtering. Least squares filtering. Recursive filtering.					

	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>45</b>	<b>0</b>	<b>45</b>
<b>TEXT</b>			
2. Mark Nixon, et.a l, “Feature Extraction & Image processing for Computer vision” 3 rd Edition, 2012.			
<b>REFERENCES</b>			
1. Gonslaez, Richard E. Woodset.a1, "Digital Image Processing", Addison Wesley, Reading, M.A., 1990.			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	2	2	2	1	1	1	2	2
CO 2	3	3	2	2	2	1	1	1	2	2
CO 3	3	3	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	2	2	2	2	2	1	1	1	2	2
Total	14	13	10	10	10	5	5	5	10	10
Course	3	3	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCAEE7 – PARALLEL PROGRAMMING

#### Course Outcomes:

	Domain	Level	
CO1	C	Understand	<i>Describe</i> the basics of Parallel Programming techniques.
CO2	C	Knowledge	<i>Understand</i> the concept of Data dependency



CO3	C	Knowledge	<i>Describe</i> and <i>apply</i> various types of Performance analysis
		Apply	
CO4	C	Understand	<i>Describe</i> and <i>solve</i> problems in Parallel Programming
CO5	C	Understand	<i>Understand the</i> Methods for Applying in Programming parallel.

Course Code	Course Name	L	T	P	C
YCAEE7	Parallel Programming	3	0	0	3
		L	T	P	H
<b>C:P:A = 3:0:0</b>		3	0	0	3
<b>UNIT- I: Parallel Programming- Introduction</b>					<b>9</b>
Processes and processors. Shared Memory. Fork. Join constructs. Basic parallel programming techniques-loop splitting, spin locks, contention barriers and row conditions.					
<b>UNIT- II: Data dependency and Scheduling</b>					<b>9</b>
Variations in splitting, self and indirect scheduling. Data dependency-Forward and Backward. Block scheduling.					
<b>UNIT- III: Performance Analysis</b>					<b>9</b>
Linear recurrence relations. Backward dependency. Performance tuning overhead with number of processes, effective use of cache.					
<b>UNIT- IV: Parallel Programming – Problems</b>					<b>9</b>
Parallel programming examples: Average, mean squared deviation, curve fitting, numerical integration, travelling salesman problem, Gaussian elimination. Discrete event time simulation.					
<b>UNIT- V: Parallel Programming Methods</b>					<b>9</b>
Parallel Programming constructs in HPF, Fortran 95. Parallel programming under Unix.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>45</b>	<b>0</b>	<b>45</b>	
<b>TEXT</b>					
1.Roosta, Seyed H, " Parallel Processing and Parallel Algorithms", 2016.					
<b>REFERENCES</b>					
1.Brawer, S., "Introduction to parallel programming", Academic Press, New York, 2005.					

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	3	3	3	2	2	2	1	1	2	2
CO 2	3	3	3	2	2	2	1	1	2	2
CO 3	3	3	3	2	2	2	1	1	2	2
CO 4	3	3	3	2	2	2	1	1	2	2
CO 5	2	2	2	2	2	2	1	1	2	2
Total	14	14	14	10	10	10	5	5	10	10
Course	3	3	3	2	2	2	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCAEE10 BIGDATA ANALYTICS

#### Course Outcomes:

- CO1 C Knowledge *Understand* the fundamentals of various big data analysis techniques
- CO2 C Understand *Identify* the architecture, infrastructure and delivery models of stream computing
- CO3 C Analyse *Analyze* the HADOOP and Map Reduce technologies
- CO4 C Understand *Apply* efficient algorithms for mining the data from large volumes
- CO5 C Apply *Explore* on Big Data applications Using Pig and Hive

COURSE CODE	COURSE NAME	L	T	P	C
YCAEE10	BIGDATA ANALYTICS	3	0	0	3
C:P:A = 3:0:0		L	T	P	H
		3	0	0	3
<b>UNIT I INTRODUCTION TO BIGDATA</b>					<b>09</b>
Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern					

Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

**UNIT II MINING DATA STREAMS** **09**

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

**UNIT III HADOOP** **09**

History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features

**UNIT IV HADOOP ENVIRONMENT** **09**

Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud

**UNIT V FRAMEWORKS** **09**

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

LECTURE	TUTORIAL	TOTAL
45	0	45

**TEXT**

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill Publishing, 2012
3. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012

**REFERENCES**

1. Da Ruan, Guoqing Chen, Etienne E. Kerre, Geert Wets, Intelligent Data Mining, Springer, 2007
2. Michael Minelli, Michele Chambers, Ambiga Dhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley, Publications, 2013
3. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, 2011

### E REFERENCES

<http://www.edureka.co/big-data-and-ha...>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO 1	1	2	2	1	1					1
CO 2	1	2	2	1				3	1	2
CO 3	2	2	2	1	1			3	1	
CO 4	1	2	3	1				3	2	
CO 5	2	3	3	1				3	2	3
Total	7	11	12	5	2			12	6	6
Course	2	3	3	1	1			3	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

### YCABM1 -MANAGERIAL ECONOMICS

#### Course Outcomes:

- CO1 C Knowledge    *Describe* Nature and scope of managerial economics  
 CO2 C Understand    *Define* and measure elasticity.  
 CO3 C Knowledge    *Describe* Product and cost analysis  
 CO4 C knowledge    *Describe* Production function  
 CO5 C Understand    *Understand* product and profits

COURSE CODE	COURSE NAME	L	T	P	C
YCABM1	Managerial Economics	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT- I: (Features of managerial economics)</b>					<b>9</b>

Nature and scope of managerial economics. Objectives of the firm .Managerial and behavioral theories of the firm.			
<b>UNIT- II: (Concepts of demand forecasting)</b>			<b>9</b>
Concepts of opportunity cost- incremental - time perspective. Principles of discounting and equimargins - Demand analysis - purposes and concepts - Elasticity of demand - Methods of demand forecasting.			
<b>UNIT – III: (Product and cost analysis)</b>			<b>9</b>
Product and cost analysis- short run and long run average cost curves - Law of supply - Economies and diseconomies of scale-Law of variable proportions			
<b>UNIT- IV : (Product and price)</b>			<b>9</b>
Production function - single output isoquants- Pricing: Prescriptive approach.- Price determination under perfect competition.			
<b>UNIT -V : (Profits and Break-even analysis)</b>			<b>9</b>
Monopoly, oligopoly and monopolistic competition - Full cost pricing- product line pricing-Pricing strategies - Profits: Nature and. measurement policy. Break-even analysis.Case study.			
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>45</b>	<b>0</b>	<b>45</b>
<b>TEXT</b>			
1. Managerial Economics- Theory and Applications, Dr. D.M Mithani, Himalaya Publications			
2. Managerial Economics, D.N Dwivedi, 6th ed., Vikas Publication.			
3. Managerial Economics, H. L Ahuja, S. Chand, 2011			
4. Indian Economy, K P M Sundharam and Dutt, 64th Edition, S Chand Publication.			
5. Business Environment Text and Cases by Justin Paul, 3rd Edition, McGraw-Hill Companies.			
<b>REFERENCES</b>			
1.Dean. J .."Management Economics".Prentice Hall of India, New Delhi. 1982.			
2.Mote.V.L..et al. "Managerial Economics: Concepts and Cases". Tata McGraw Hill.New Delhi, 1980.			

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	2	1	1	1	2	2
CO 2	2	1	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	1	2	1	1	2	1	1	1	2	2
Total	09	08	05	05	10	5	5	5	10	10
Course	03	02	01	01	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCABM2- CORPORATE PLANNING

#### Course Outcomes:

- CO1 C Knowledge *Describe* various methods to define *Corporate Planning and Budgeting*
- CO2 C Understand *Understand* and apply set *Social Responsibilities*
- CO3 C Knowledge *Describe* and *apply* various *Professionalism*
- CO4 C Understand *Describe* and *solve* problems in *Mission and Purpose*
- CO5 C Understand *Understand* Concept of learning the *Organisation Appraisal*

COURSE CODE	COURSE NAME	L	T	P	C
YCABM2	Corporate Planning	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT- I: Corporate Planning and Budgeting</b>					<b>09</b>
Significance of Planning: Types-Needs-Requisites-Corporate planning: system approach- Role of the planner-Corporate planning and budgeting.					
<b>UNIT- II: Social Responsibilities</b>					<b>09</b>
Social responsibilities: Scope, contents, cooperation and society, consumers, corporation and democracy, community-government.					
<b>UNIT- III: Professionalism</b>					<b>09</b>

Social responsibility-versus profitability-productivity-growth-Professionalism as a means of social behaviour.

**UNIT- IV: Mission and Purpose** **09**

Mission and purpose: Business definitions - objectives and goals-Environment appraisal: Concepts, components-Scanning and appraising the environment.

**UNIT- V: Organisation Appraisal** **09**

Organization appraisal: Dynamics-capability factors- Considerations- Methods and techniques- Structuring- Planning gaps: Gap analysis- Manager audit: Significance of gaps.

LECTURE	TUTORIAL	TOTAL
45	0	45

**TEXT**

- 1.Kazni. A .. "Business Policy". Tata McGraw Hill. New Delhi, 1992.
- 2.Johnson. G .. etal. 3rd edition. "Exploring corporate Strategy", Prentice Hall of India, New Delhi. 1994.

**REFERENCES**

- 1.CA.(Dr.)K.M. Bansal "Corporate Accounting". Taxmann.S. University of Delhi.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	1	1	2	1	1	1	2	2
CO 2	2	1	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	1	1	1	2	1	1	1	2	2
Total	10	8	5	5	10	5	5	5	10	10
Course	2	2	1	1	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

**YCABM3- FOUNDATIONS OF DECISION PROCESSES**

**Course Outcomes:**

- CO1 C Knowledge *Describe* various methods to define role of decision making  
 CO2 C Understand *Understand* and apply game theory and competitive strategies

- CO3 C Knowledge *Describe* and *apply* various queuing and inventory models
- CO4 C Understand *Describe* and *solve* problems in Finance.
- CO5 C Understand *Understand* Systematic problem analysis

Course Code	Course Name	L	T	P	C
YCABM3	<b>Foundations of Decision Processes</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C:P:A =</b>					
<b>3:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT- I:-Decision Making</b>					<b>9</b>
Role of decision making in management-Framework-Criteria under conditions of certainty-risk and uncertainty-Baytes theorem-Sequential decision making decision tree analysis.					
<b>UNIT –II: Competitive Strategies</b>					<b>9</b>
Theory of utility- Utility function curve- Competitive strategies, game theory- Queuing model-Single channel, single phase waiting line model with Poisson.					
<b>UNIT- III: Simulation</b>					<b>9</b>
Distributed arrival rates and exponentially distributed service times-Markov models-Simulation: Monte Carlo- Application to queuing and inventory models-Applications in functional areas of marketing, production.					
<b>UNIT- IV: Finance</b>					<b>9</b>
Finance- Behavioral aspects in decision making-open and closed models of decisions.					
<b>UNIT –V: Systematic Problem Analysis</b>					<b>9</b>
Systematic problem analysis and decision making- Decision making in functional areas - case studies.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>45</b>	<b>0</b>	<b>45</b>	
<b>TEXT</b>					
1. Gregory, G. "Decision analysis", Pitman, London, .1988.					
2. Johnson. R.D .. et. al. "Quantitative Techniques filr Business Decisions". Prentice Hall. N.J ..1977.					
<b>REFERENCES</b>					
1. Ronald A. Howard, Ali E. Abbas, “ <i>Foundations of Decision Analysis</i> ”.Pearson,. 2016.					



2. David C. Skinner., "Introduction to decision analysis", 3<sup>rd</sup> edition, A practitioner's guide to improving decision quality, 1999.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	2	1	1	1	2	2
CO 2	2	1	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	2	1	1	2	1	1	1	2	2
Total	10	8	5	5	10	5	5	5	10	10
Course	2	2	1	1	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

#### YCABM4- INVESTMENT TECHNOLOGY

##### Course Outcomes:

- CO1 C Knowledge    *Describe* various methods to define Source of *investment information*
- CO2 C Understand    *Understand* and apply set *Interest Rates*
- CO3 C Knowledge    *Describe* and *apply* various *Shares and Valuation*
- CO4 C Understand    *Describe* and *solve* problems in *Portfolio Theory*
- CO5 C Understand    *Understand* Concept of learning the *Mutual Funds*

COURSE CODE	COURSE NAME	L	T	P	C
YCABM4	Investment Technology	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT- I:Investment Information-Introduction</b>					<b>9</b>
Source of investment information -Valuation of debt securities: Debt prices and interest rate risk-Default risk and purchasing power risk.					
<b>UNIT- II:Interest Rates</b>					<b>9</b>

Market interest rates - term structure of interest rates- Valuation of warrants-convertibles- Option pricing models.

**UNIT- III: Shares and Valuation** **9**

Valuation of equity shares: Dividends and valuation: MMS arguments, fundamental analysis- Earning multipliers-Timing of purchase -sale of equity shares-Estimating earnings and risk.

**UNIT- IV: Portfolio Theory** **9**

Portfolio theory- Efficient investments –diversification-Markowitz graphical portfolio analysis-Capital market theory- Portfolio performance evaluation- sharpe.

**UNIT- V: Mutual Funds** **9**

Treynor- Jenson measures- Mutual funds - kinds and evaluation-Behaviour of share prices - technical analysis-The efficient markets-Hypothesis - random walk and Martingale methods.

LECTURE	TUTORIAL	TOTAL
45	0	45

**TEXT**

Clark N.et. al. "Financial Management: A Capital Market Approach". Helbrook, 1976

**REFERENCES**

Sharpe. W.F., "Investments". Prentice Hall of India. New Delhi. 1996.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	2	2	1	2	1	1	1	2	2
CO 2	2	2	1	1	2	1	1	1	2	2
CO 3	2	2	1	1	2	1	1	1	2	2
CO 4	2	2	1	1	2	1	1	1	2	2
CO 5	2	2	1	1	2	1	1	1	2	2
Total	10	10	6	5	10	5	5	5	10	10
Course	2	2	1	1	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

**YCABM5-BUSINESS FINANCE**

**Course Outcomes:**

CO1	C	Knowledge	<i>Describe</i> various methods to define financial and economic development
CO2	C	Understand	<i>Understand</i> and apply primary and secondary capital market
CO3	C	Knowledge	<i>Describe</i> and <i>apply</i> various managerial problems
CO4	C	Understand	<i>Describe</i> and <i>solve</i> problems in non-banking financial institutions
CO5	C	Understand	<i>Understand</i> Credit rating information

COURSE CODE	COURSE NAME	L	T	P	C
YCABM5	<b>Business Finance</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C:P:A = 3:0:0</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>UNIT- I:Introduction to Business Finance</b>					<b>9</b>
Financial and economic development- Intermediation, role and patterns- Functions of money and capital markets- Interest rates, determination, term structure.					
<b>UNIT –II: Financial Intermediaries</b>					<b>9</b>
Primary capital market: new issues, growth and trends- Financial intermediaries: merchant bankers- managers, brokers, underwriters-Secondary market - organization and functioning- Trading and settlement.					
<b>UNIT – III: Managerial Problems</b>					<b>9</b>
Problems relating to membership- commission- margins- arbitration and off-floor trading- Reforming the markets- SEBI- Market for government securities-the discount and finance house-Operation and managerial problems of commercial banks.					
<b>UNIT- IV:Non-Banking Financial Institutions</b>					<b>9</b>
Inter-bank call money market- Non-banking financial institutions: lending policies, schemes, composition and quantum of assistance of IDBI. IFCI. ICICI, UTI- LIC, GIC and state level financial corporations.					
<b>UNIT- V: Credit Rating Information</b>					<b>9</b>
Credit rating information: Parameters. Role- Agencies- CRISIL- Regulatory framework for financial markets and institutions: regulation versus deregulation- Role of RBI-Bank rate, open market operation policies.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>45</b>	<b>0</b>	<b>45</b>	
<b>TEXT</b>					

1. Eddie McLaney., “Business Finance Theory and practice “, 8<sup>th</sup>edition , Pearson Education ,2009.

#### REFERENCES

1. Copeland, T.E., et. al, "Financial Theory and Corporate Policy". Addison Wesley, Reading, MA. 1988.
2. Uppal.J.S., "Public Financial Institutions in India", Mac Millan, New York, 1984.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	2	2	2	1	1	1	2	2
CO 2	3	1	2	2	2	1	1	1	2	2
CO 3	2	2	2	2	2	1	1	1	2	2
CO 4	3	2	2	2	2	1	1	1	2	2
CO 5	3	2	2	2	2	1	1	1	2	2
Total	13	08	10	10	10	5	5	5	10	10
Course	3	02	2	2	2	1	1	1	2	2

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCABM6 TAXATION PRACTICES

#### Course Outcomes:

- CO1 C Knowledge *Characterize* various scheme of taxation  
 CO2 C Understand *Discuss* the various types of assessment  
 CO3 C Knowledge *Describe* the modes of recovery  
 CO4 C knowledge *Describe* and apply the wealth and health tax  
 CO5 C Understand *Understand* the issues state sales tax

COURSE CODE	COURSE NAME	L	T	P	C
YCABM6	Taxation Practices	3	0	0	3
<b>C:P:A =3:0:0</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		3	0	0	3
<b>UNIT- I: Assessment of undivided families</b>					<b>9</b>

Assessment of undivided families: Meaning-Basic conditions- Taxable income- Partitions- Tax planning- Assessment of firms and associations: Scheme of taxation- types- treatment of losses- Tax planning.

**UNIT- II: Assessment of companies** **9**

Assessment of companies: Types-profits-depreciation-tax planning-Section 80- Bonus issues- dividend policy-Return of income and assessment procedure: Types of assessment- Time limits-Reassessment-Cooperatives.

**UNIT – III: Collection and recovery of tax** **9**

Collection and recovery of tax: Deduction at source-rates-advance payment-Modes of recovery-Refund-Appeals and revision-Penalties.

**UNIT- IV: Wealth Tax** **9**

Wealth Tax: Chargeability-valuation-return-appeals-revisions-payment and recovery, gift tax: chargeability-rebate-assessment-appeals-revisions-payment and recovery.

**UNIT- V: Central sales tax** **9**

Central sales tax: Concept of sale and purchase-Inter-state trade-Inter-state export and import trade. State sale tax: Assessing authority-Single-multiple point tax-Procedure for registration and cancellation>Returns-payment-appeals and revisions.

LECTURE	TUTORIAL	TOTAL
45	0	45

**TEXT**

1. " Girish Ahuja & Ravi Gupta ",Systematic Approach to Income Tax, Bharat Law House Pvt. Ltd, New Delhi.
2. " Vinod K. Sinhanian & Monica Sinhanian", Income Tax, Taxmann Publications Pvt. Ltd, New Delhi.
3. " Mehtrotra & Goyal" ,Taxation Law & Practice, Sahitya Bhavan Publication, Agra.
4. "Lal B.B" , Direct Taxes, Konark Publishing House, New Delhi.
5. " VS.Datey", Indirect Taxes law and practice Taxman allied services pvt. Ltd.Books in India"

**REFERENCES**

1. Central and State tax acts,Singhanian, VK.,"**Taxman Direct Taxes**", Taxman, New Delhi. 1996.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
CO 1	2	1	1	1	1	1	1	1	1	1
CO 2	2	1	1	1	1	1	1	1	1	1
CO 3	2	2	1	1	1	1	1	1	1	1
CO 4	2	2	1	1	1	1	1	1	1	1
CO 5	1	2	1	1	1	1	1	1	1	1
Total	09	08	05	05	05	05	05	05	05	05
Course	03	02	01	01	01	01	01	01	01	01

0-No relation 3- Highly relation 2- Medium relation 1- Low relation

### YCABM7 MIS FRAMEWORKS AND IMPLEMENTATION

#### Course Outcomes:

- CO1 C Knowledge *Describe* variety of framework for identifying information technology
- CO2 C Understand *Discuss* the benefits of IT
- CO3 C Knowledge *Describe* the new strategic role of information system
- CO4 C knowledge *Describe* the business process reengineering
- CO5 C Understand *Discuss* the managing IT function

COURSE CODE	COURSE NAME	L	T	P	C
YCABM7	MIS Frameworks and Implementation	3	0	0	3
<b>C:P:A =3:0:0</b>					
		L	T	P	H
		3	0	0	3
<b>UNIT- I: Introduction to MIS</b>					<b>9</b>
This course will discuss a variety of frameworks for identifying information technology applications- The scope of IT applications would cover Management Information System- Decision Support System- Executive Information System and Expert System.					

<b>UNIT- II: Managing Data Resource</b>	<b>9</b>						
Provide a broad understanding of the types of the benefits information technology applications can provide in an organization through transaction processing- management and operational control-decision support systems- office automation-organizational communications and group work support.							
<b>UNIT- III: IT Strategy</b>	<b>9</b>						
Socio-economic environment and information systems in organization and the impact of information systems on organizations markets- frameworks for information systems planning-information systems and competitive advantage-the new strategic role of information systems: methodologies for evaluating investments in IT-frameworks and methodologies- should be discussed and illustrated with case studies.							
<b>UNIT -IV : Business Process Integration with IT</b>	<b>9</b>						
Design of reporting system including a discussion of principles in indicator design-managing information support activity in organization- concept of the business process re-engineering (BPR) and how IT can enable BPR							
<b>UNIT- V: Managing IT function</b>	<b>9</b>						
Critical success factor in implementing IT applications including the need for managing the process of change illustrated through case studies of successful/failed IT projects-Critical role of security in implementing IT applications should be discussed.							
	<table border="1"> <thead> <tr> <th>LECTURE</th> <th>TUTORIAL</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>45</td> <td>0</td> <td>45</td> </tr> </tbody> </table>	LECTURE	TUTORIAL	TOTAL	45	0	45
LECTURE	TUTORIAL	TOTAL					
45	0	45					
<b>TEXT</b>							
1. Kenneth C.Laudon.Jane P.Laudon, "Management information systems", Pearson, 14th edition.							
<b>REFERENCES</b>							
1. David olson, "Information system project manangement",2015.							
2. Paige baltzan, Amy phillips , "Business - Driven Information System",2015.							

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
<b>CO 1</b>	3	3	2	2	2	1	1	1	2	2
<b>CO 2</b>	3	3	2	2	2	1	1	1	2	2
<b>CO 3</b>	3	3	2	2	2	1	1	1	2	2

<b>CO 4</b>	3	2	2	2	2	1	1	1	2	2
<b>CO 5</b>	2	2	2	2	2	1	1	1	2	2
<b>Total</b>	14	13	10	10	10	5	5	5	10	10
<b>Course</b>	3	3	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

## YCABM8- MANAGEMENT OF SOFTWARE PROJECTS

### Course Outcomes:

- CO1 C Knowledge    *Describe* various methods to define Software projects
- CO2 C Understand    *Understand* and apply project scheduling and project management.
- CO3 C Knowledge    *Describe* and *design* system life cycle
- CO4 C Understand    *Describe* and *solve* problems related to the project
- CO5 C Understand    *Understand* and determine skill requirements

Course Code	Course Name	L	T	P	C
YCABM8	Management of Software Projects	3	0	0	3
<b>C:P:A = 3:0:0</b>					
		L	T	P	H
		3	0	0	3
<b>UNIT- I:-Introduction</b>					<b>9</b>
Managerial Issues in Software Projects-Introduction to software markets-Planning of software projects-Size and Cost Estimations.					
<b>UNIT –II: Project Scheduling and Management</b>					<b>9</b>
Project Scheduling-Measurement of software quality and productivity-ISO and Capability Maturity Models for organizational growth-Project management and Practice.					
<b>UNIT- III: System life cycle and Design</b>					<b>9</b>
Managing the systems life cycle- requirements determination-logical design-physical design- testing-implementation.					
<b>UNIT- IV: Integration issues and Project Management</b>					<b>9</b>
System and database integration issues-metrics for project management and systems performance evaluation-managing expectations- superiors-users-team members and other related to the project.					



**UNIT- V: Cost Effectiveness Analysis****9**

Determining skill requirements and staffing the project-cost-effectiveness analysis-reporting and presentation techniques-and effective management of both behavioural and technical aspects of the project.

LECTURE	TUTORIAL	TOTAL
45	0	45

**TEXT**

1. Gilb, T., "Principles of Software Engineering Management", Addison Wesley. Reading. M.A. 1988.
2. Putnam. L.H . Myers. W., "Industrial Sire"" Software - Effective Management using Measurement". IEEE C.S. Press. 1997.

**REFERENCES**

1. Dr.Jeroen Arnoldus, Dr.Sieuwert Van Otterloo, Dr.Joost Schalken-Pinkster, "Software Project Management", ICT Institute
2. Lean Agile and Kanban , " Software Engineering Management", on Pawel Brodzinski
3. "Principles of Software Development Leadership: Applying Project Management Principles to Agile Software Development" by Ken Whitaker.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2
<b>CO 1</b>	3	3	2	2	2	1	2	2	3	3
<b>CO 2</b>	2	2	2	2	2	1	2	2	3	3
<b>CO 3</b>	2	1	2	2	2	1	2	2	3	3
<b>CO 4</b>	2	2	2	2	2	1	2	2	2	2
<b>CO 5</b>	2	1	2	2	2	1	2	2	2	2
<b>Total</b>	11	09	10	10	10	5	10	10	13	13
<b>Course</b>	03	02	2	2	2	1	1	1	3	3

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

**YCABM9 BLOCKCHAIN TECHNOLOGY****Course Outcomes:**

CO1	C	Knowledge	<i>Describe</i> distributed database
CO2	C	Understand	<i>Understand</i> block chain network
CO3	C	Understand	<i>Understand</i> crypto currency and bit coin
CO4	C	Understand	<i>Understand</i> crypto currency regulation
CO5	C	Apply	<i>Apply</i> block chain applications

COURSE CODE	COURSE NAME	L	T	P	C
YCABM9	BLOCKCHAIN TECHNOLOGY	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3
<b>UNIT-I: INTRODUCTION TO BLOCK CHAIN</b>					9
Introduction, Advantage over conventional distributed database, Block chain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public block chain.					
<b>UNIT-II: DISTRIBUTED CONENSUS</b>					9
Distributed Consensus: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.					
<b>UNIT – III: CRYPTOCURRENCY</b>					9
Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin					
<b>UNIT- IV: CRYPTOCURRENCYREGULATION AND APPLICATIONS</b>					9
Cryptocurrency Regulation: Stakeholders, Roots of Bitcoin, Legal Aspects - Cryptocurrency Exchange, Black Market and Global Economy- Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain					
<b>UNIT-V: NEXT GENERATION INDUSTRY</b>					9
Industry 4.0: The Fourth Revolution- - Sustainability Assessment of Manufacturing Industry - Lean Production System - Smart and Connected Business Perspective - Smart Factories – Industry 5.0					
		LECTURE	TUTORIAL	TOTAL	
		45	-	45	
<b>TEXT</b>					

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

2. Blockchain for Beginners: The Complete Step by Step Guide to Understanding Blockchain Technology by Mark Watney

**Reference**

1. Cryptocurrencies and Blockchains by Quinn DuPont

2. Blockchain Applications: A Hands-On Approach Paperback by Arshdeep Bahga

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO 1</b>	3	1	2	2	2	1	1	1	2	2
<b>CO 2</b>	3	1	2	2	2	1	1	1	2	2
<b>CO 3</b>	2	1	2	2	2	1	1	1	2	2
<b>CO 4</b>	2	1	2	2	2	1	1	1	2	2
<b>CO 5</b>	3	2	2	2	2	1	1	1	2	2
<b>Total</b>	13	6	10	10	10	5	5	5	10	10
<b>Course</b>	3	2	2	2	2	1	1	1	2	2

0-No relation    3- Highly relation    2- Medium relation    1- Low relation

# 1. Minutes of Board of Studies held on 22.9.2020 for B.Sc Computer Science (Software Engineering)

Department of Software Engineering

Periyar Nagar, Vallam Thanjavur - 613 403, Tamil Nadu, India  
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## MINUTES OF THE BOARD OF STUDIES (Regulations 2020)

Date: 22.09.2020

Time: 11.00 AM

Members present

S.No	Name	Designation	Representing	Signature
1.	Dr. P.Aruna	Head / Asso. Professor	Chair person	<i>P. Aruna</i>
2.	Dr.J.Jeyachidra	Asso. Professor/CSA & Deani/c/FCSE	Member	<i>J. Jeyachidra</i>
3.	Dr.Jayanthi	Professor, Dept. of Civil Engg.	Member	<i>P. Jayanthi</i>
4.	Dr.A.Sasikala	Asso.Prof & HOD /Maths	Member	<i>A. Sasikala</i>
5.	Dr.K.Kesavan	Asst.Prof & HOD/Physics	Member	<i>K. Kesavan</i>
6.	Dr K.Selvam	Asst.Prof & HOD/English	Member	<i>K. Selvam</i>
7.	Dr.K.Mohankumar	Asst. Prof. PG Research Department of Computer Science, Rajah Serfoji Govt. College, Thanjavur.	Member (Academia)	<i>through online</i>

8.	Mr.J.Roy Jose	Team Lead, Stead Fast Technologies, Chennai	Member (Industry)	through online
9.	Mr. D.Maghesh Kumar	Assistant Professor / SE	Member	through online
10.	Ms.S.Manjula	Assistant Professor / SE	Member	through online
11.	Mr. A.M.Karthick	Student V Year, M.Sc. SE	Member	through online

**Agenda:**

The main objective of this is to prepare a comprehensive course structure for undergraduate Computer Science programme.

It is a student centric framework where they are expected to learn fundamentals of computer science along with the latest trends and techniques.

Points to be discussed

1. Reframing Graduate attributes, Program Outcomes, Course Outcomes, Mappings and Curriculum Alignment Matrix.
2. Framing Curriculum for B.Sc. (Computer Science) Degree programme based on the LOCF (Learning Outcome based Curriculum Framework) recommended by UGC.
3. Developing Syllabus from I - VI semesters for B.Sc. (Computer Science) Degree programme.

The members of Board of studies of Department of Software Engineering met on 22.09.2020 and discussed and framed the curriculum and syllabus for B.Sc. (Computer Science) programme for Regulation 2020.

**I FEEDBACK COLLECTED, ANALYZED AND ACTION TAKEN**

Alumni students: Yes

Parents: Yes



Employers: Yes

Students: Yes

Academicians: Yes  
(Indian and Foreign)

Industrial Persons: Yes

Course Teachers: Yes

Important observations made and addressed in BOS and modified as per the Learning Outcomes-based Curriculum Framework (LOCF) recommended by UGC.

1. Number of credits increased from 125 to 140 + 2(Extra Credit).  
(Credits recommended by UGC is 132 to 148).
2. Reframing of courses as per the compulsory and suggestive list provided by UGC.
3. Reordering of courses to maintain the flow of study of the entire programme.
4. Inclusion of lab elements in the Theory cum Lab course.
5. Introducing new courses to meet the industrial expectations.
6. Reframing of Graduate Attributes, Program Outcomes, Course Outcomes and Curriculum Alignment Matrix.

## II. COMPARISON BETWEEN REGULATIONS 2019 & 2020

Semester	Regulation 2019 - Course Name	Regulation 2020 - Course Name	Addition / Deletion
I	Communication Skills in English	Basic English Communication Skills	Title changed
	Problem Solving Using C	Programming Methodologies	Removed Problem Solving Using C course and Programming Methodologies included
II	Programming in C++	Object Oriented Programming	Course title rephrased and moved to IV Sem
	Computer Architecture	Computer Organization & Architecture	Course title rephrased and moved to V Sem

III	Programming in Java	Programming in Java	Course moved to V Sem
	Disaster Management	Disaster Management	Moved to II Sem
IV	Open-source software	-	Removed Course
	Data Structures and Algorithms	Data Structures Algorithms	Data Structures moved to II Sem Algorithms moved to III Sem
	Computer Networks	Computer Networks	Moved as elective paper to V Sem
	. Net Technologies	. Net Technologies	Moved as elective to V Sem
	Total Quality Management	-	Removed
	E Commerce	-	Removed
	Python Programming	Python Programming	Moved as elective to V Sem
V Sem	Software Engineering	Software Engineering	Moved to elective
	Data Base Management System	Data Base Management System	Moved to IV Sem
	Data Warehousing and Data Mining	Data Mining	Rephrased and moved to VI Sem
	Computer Graphics	Computer Graphics	Moved to VI Sem
	Game Programming	-	Removed
VI Sem	Cloud Computing	Cloud Computing	
	Web Technologies	Web Technologies	
	Ethical Hacking	-	Removed
	Client Server Computing	-	Removed
	Software Testing and Quality Assurance	-	Removed
	System Analysis and Design	-	Removed
	Management Information System	-	Removed

#### COURSES INTRODUCED AS PER UGC RECOMMENDED STRUCTURE

- ❖ **Ability Enhancement Compulsory Courses (AECC)**  
English, Tamil and Environmental Studies should occupy I & II semesters.
- ❖ **Core Courses (CC) - Computer Science**  
CC-A (Compulsory) and CC-B, C (Auxiliary) introduced in I, II, III, IV semesters.  
New Course Introduced:
  - Programming Methodologies
- ❖ **Skill Enhancement Courses (SEC)** should be in III, IV, V, VI semesters.



**New Course Introduced:**

- MATLAB Programming
- Mobile Application Development

❖ **Discipline Specific Elective (DSE)** should be present in V, VI semesters.

**New Course Introduced:**

- Computer Ethics
- GIMP (GNU Image Manipulation Program)
- Theory of Computation
- Internet Technologies
- System Security
- Machine Learning
- Human Computer Interface
- Data Analytics

**III. MINOR COURSES PROVIDED**

- R Programming
- Angular JS

**IV. OVERALL PERCENTAGE OF CHANGES COMPARED TO REGULATION 2019**

- 52 Percentage

## 2. Extracts of Minutes of the 36<sup>th</sup> Academic Council held on – 10.10.2020 for B.Sc Computer Science (SE) programme

Periyar Nagar, Vallam Thanjavur - 613 403, Tamil Nadu, India  
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### MINUTES OF THE THIRTY SIXTH MEETING OF THE ACADEMIC COUNCIL

**Date : 10.10.2020**

**Venue : Through Google Meet**

**Time : 11.00 A.M**

**Place : PMIST, Vallam – Thanjavur**

The Thirty Sixth meeting of the Academic Council of the Periyar Maniammai Institute of Science & Technology (PMIST), Vallam, Thanjavur held on 10.10.2020 at 11.00 a.m. through Google Meet.

Prof.S.Velusami, Hon'ble Vice-Chancellor, chaired the meeting.

The following Academic Council Members were present (Through Google meet):

- |                                |        |                   |
|--------------------------------|--------|-------------------|
| 1. Dr.A.Anand Jerard Sebastine | Member | Activate Win      |
| 2. Dr.A.P.Aruna                | Member | Go to Settings to |
| 3. Dr.P.Aruna                  | Member |                   |

M.Tech.- Nanc 36.4.9				
FET M.Tech.- Nanc 36.4.10	M.Tech Nanotechnology – Part- Time	I to VI	2018	

### **5. FACULTY OF COMPUTING SCIENCES & ENGINEERING (FCSE)**

Agenda	Programme	Semester	Regulation	Remarks
FCSE BCA 36.5.2	BCA (3 Years)	I to IV	2018 Revision I	The students admitted in the Academic Year 2020-2021 will follow the given regulations
FCSE CSE 36.5.3	B.Tech.-CSE	I to VIII	2019	
FCSE B.Sc.- A&M 36.5.4	B.Sc.-Animation & Multimedia	I to VI	2018	
FCSE B.Sc.- CS 36.5.5	B.Sc.-Computer Science	I to VI	2020	

**1.1 3. Curriculum and Syllabus for the B.Sc Computer Science (SE) programme –  
Before Revision**

**1.2**

**CURRICULUM for B. Sc (Computer Science)**

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
AECC 1	XGL101	Communication Skills in English	2	0	0	2	2	2	0	0	2	4
LANG	XGL102A/ XGL102B	Ariviyal Tamil/ Comprehensive English	3	0	0	0	3	3	0	0	0	3
CC-1	XBC103	Computer Fundamentals	3	0	1	0	4	3	0	2	0	5
CC-2	XBC104	Algebra, Calculus & Analytical Geometry	4	1	0	0	5	4	1	0	0	5
CC-3	XBC105	Problem Solving Using C	3	0	1	0	4	3	0	2	0	5
UMAN-1	XUM106	Human Ethics, Values, Rights, and Gender Equality	3	0	0	0	0	3	0	0	0	3
		<b>Total</b>	<b>18</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>18</b>	<b>18</b>	<b>1</b>	<b>4</b>	<b>2</b>	<b>25</b>

**REGULATIONS – 2019**

(Applicable to the students admitted from the Academic year 2019)

**I SEMESTER**

**II SEMESTER**

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total

AECC-2	XGL201	English for Effective Communication	2	0	0	2	<b>2</b>	2	0	0	2	4
UMAN-2	XES 202	Environmental Studies	2	0	0	1	<b>0</b>	2	0	0	1	3
CC-4	XBC 203	Programming in C++	3	0	1	0	<b>4</b>	3	0	2	0	5
CC-5	XBC 204	Discrete Mathematics	3	1	0	0	<b>4</b>	3	1	0	0	4
CC-6	XBC205	Computer Architecture	3	1	0	0	<b>4</b>	3	1	0	0	4
CC-7	XBC206	Digital Electronics	3	0	1	<b>0</b>	4	3	0	2	0	5
		<b>Total</b>	<b>16</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>18</b>	<b>16</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>25</b>

### III SEMESTER

Category	Course Code	Course Name	Credits				Hours				
			L	T	P	Total	L	T	P	SS	Total
SEC-1	XBC301	Multimedia Systems	3	0	2	5	3	0	2	0	5
CC-8	XBC302	Operating System	3	1	0	4	3	1	0	0	4
CC-9	XBC303	Programming in Java	3	0	2	5	3	0	2	0	5
CC-10	XBC304	Allied Physics	3	1	0	4	3	1	0	0	4
UMAN-3	XUM306	Disaster Management	3	0	0	0	3	0	0	0	3
GE1		*Open Elective - To be chosen by student	3	0	0	3	3	0	0	0	3
Minor Course * Extra Credit		R Programing									
		<b>Total</b>	<b>17</b>	<b>2</b>	<b>4</b>	<b>21</b>	<b>17</b>	<b>2</b>	<b>4</b>	<b>0</b>	<b>24</b>

### IV SEMESTER

Category	Course Code	Course Name	Credits				Hours			
			L	T	P	Total	L	T	P	Total
SEC-2	XBC401	Open source software	3	1	0	4	3	1	0	4
CC-11	XBC402	Data Structures and Algorithms	3	0	1	4	3	0	2	5
CC-12	XBC403	Computer Networks	3	1	0	4	3	1	0	4
CC-13	XBC404	. Net Technologies	3	0	1	4	3	0	2	5
DSE-1	XBC405A	Principles of Management	3	0	0	3	3	0	0	3
	XBC405B	Total Quality Management	3	0	0	3	3	0	0	3

	XBC405C	E Commerce	3	0	0	3	3	0	0	3
GE-2		*Open Elective - To be chosen by student	3	0	0	3	3	0	0	3
Minor Course * Extra Credit		Python Programming								
		<b>Total</b>	<b>17</b>	<b>2</b>	<b>2</b>	<b>22</b>	<b>17</b>	<b>2</b>	<b>4</b>	<b>24</b>

### V SEMESTER

Category	Course Code	Course Name	Credits				Hours			
			L	T	P	Total	L	T	P	Total
SEC3	XBC501	Software Engineering	3	0	0	3	3	0	0	3
CC-14	XBC502	Data Base Management System	3	0	1	4	3	0	2	5
CC-15	XBC503	Data Warehousing and Data Mining	3	1	1	5	3	1	2	6
CC-16	XBC504	Statistics	3	1	0	4	3	1	0	4
DSE-2	XBC505A	Computer Graphics	3	0	0	3	3	0	0	3
	XBC505B	Digital Image Processing	3	0	0	3	3	0	0	3
	XBC505C	Game Programming	3	0	0	3	3	0	0	3
GE-3		GE-2	3	0	0	3	3	0	0	3
Minor Course * Extra Credit		Angular JS								
			18	3	2	22	18	3	4	24

### VI SEMESTER

Category	Course Code	Course Name	Credits				Hours			
			L	T	P	Total	L	T	P	Total
SEC-4	XBC601	Cloud Computing	2	1	0	3	2	1	0	3
CC-17	XBC602	Web Technologies	3	0	1	4	3	0	2	5
SEC-5	XBC603	Ethical Hacking	2	1	0	3	2	1	0	3
DSE-3	XBC604A	Internet of Things	3	0	0	3	3	0	0	3
	XBC604B	Client Server Computing	3	0	0	3	3	0	0	3

	XBC604C	Artificial Intelligence	3	0	0	3	3	0	0	3
DSE-4	XBC605A	Software Testing and Quality Assurance	3	0	0	3	3	0	0	3
	XBC605B	System Analysis and Design	3	0	0	3	3	0	0	3
	XBC605C	Management Information System	3	0	0	3	3	0	0	3
DSE-5	XBC606	Project Work	0	0	4	6	0	0	8	8
			13	2	5	22	13	2	10	25

<b>COURSE CODE</b>	<b>XGL101</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>	<b>C</b>
<b>COURSE NAME</b>	<b>COMMUNICATION SKILLS IN ENGLISH</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>	<b>2</b>
<b>C:P:A - 3:0:0</b>							
<b>COURSE OUTCOMES:</b>		<b>Domain</b>		<b>Level</b>			
CO1	<i>Explain</i> the process of communication and its types	Cognitive		Understanding			
CO2	<i>Recall</i> various sounds and use it in proper context	Cognitive		Remembering			
CO3	<i>Organise</i> meeting events and recording it constructively	Cognitive		Applying			
CO4	<i>Adapt</i> methods of framing questions and using punctuations	Cognitive		Creating			
CO5	<i>Demonstrate</i> the basic skills at the time of interview and presentations	Cognitive		Understanding			



<b>SYLLABUS</b>		<b>HOURS</b>
<b>UNIT I</b>	<b>The Process of Communication</b>	
Communication- the process of communication - barriers of communication - different types of communication		9
<b>UNIT II</b>	<b>Phonetics</b>	
Pronunciation – Vowels – Consonants – Transcription of Words and Sentences		9
<b>UNIT III</b>	<b>Report Writing</b>	
Organizing successful meeting, One to one meeting, editing, criteria for successful meetings, memo, e mails		9
<b>UNIT IV</b>	<b>Grammar</b>	
Articles – Question Tag –Punctuation – Types of Sentences – Types of Questions, Cause and Effect.		9
<b>UNIT V</b>	<b>Presentation Skills</b>	
Presentation skills, Importance of body language in presentations, Verbal and Non Verbal communication		9
<b>Total Hours</b>		<b>45</b>
<b>Text books</b>		
Sanghita Sen. Communication and Language Skills. Cambridge Press, Chennai, 2015 Sumant. <i>Technical English</i> . Vijay Nicole Imprints, Chennai, 2011 Dorathyadams. Everyday English. Cengage Learning, New Delhi, 2009		

**Table 1: Mapping of Cos with POs:**

	<b>P O 1</b>	<b>P O 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PS O1</b>	<b>PS O2</b>
<b>CO 1</b>	2	0	0	0	0	0	2	0	1	0	0	0	0	0
<b>CO 2</b>	2	0	0	0	0	0	2	0	1	0	0	0	0	0
<b>CO 3</b>	1	0	0	0	0	0	1	0	1	0	0	0	0	0
<b>CO 4</b>	2	0	0	0	0	0	1	0	1	0	0	0	0	0
<b>CO 5</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Tot al</b>	7	0	0	0	0	0	6	0	4	0	0	0	0	0
<b>Scal ed Val ue</b>	2	0	0	0	0	0	2	0	1	0	0	0	0	0
	1	0	0	0	0	0	1	0	1	0	0	0	0	0

1-5= 1, 6-10 = 2, 11-15= 3

0-No Relation, 1- Low Relation, 2 – Medium Relation, 3- High Relation

**Table 2: Mapping of COs with GAs:**

	<b>GA 1</b>	<b>GA 2</b>	<b>GA 3</b>	<b>GA 4</b>	<b>GA 5</b>	<b>GA 6</b>	<b>GA 7</b>	<b>GA 8</b>	<b>GA 9</b>	<b>GA 10</b>	<b>GA1 1</b>	<b>GA1 2</b>
<b>CO1</b>	0	0	0	0	0	0	0	1	1	2	0	0
<b>CO2</b>	0	0	0	0	0	0	0	0	0	2	0	0
<b>CO3</b>	0	0	0	0	0	0	0	0	0	1	0	0
<b>CO4</b>	0	0	0	0	0	0	0	0	0	0	1	0

CO5	0	0	0	0	0	0	0	1	1	1	1	0
<b>Total</b>	0	0	0	0	0	0	0	2	2	6	2	0
<b>Scale</b>	0	0	0	0	0	0	0	1	1	2	1	0

1-5= 1, 6-10 = 2, 11-15= 3

0-No Relation, 1- Low Relation, 2 – Medium Relation, 3- High Relation

XGL102 A			mwptpay;jkpo				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.9</b>	<b>0.1</b>	<b>0</b>					<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b> Nil										
<b>COURSE OUTCOMES</b>						<b>DOMAIN</b>		<b>LEVEL</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Recognize(milahsk; fhZjy;)gy;NtWmwptpay; Jiwrrhu;e;JEl;gq;fs;&gt;fiyr; nrhy;yhf;fcj;jpfs; Nghd;wtw;iwj; jkpo;nkhop %yk; mwpe;Jnfhs;sy;.</i>					Cognitive		Remember		
<b>CO2</b>	<i>Choose (njupTnra;jy;)tlnkhopNtu;r;nrhw;fs;&gt;Gtpapay;&gt;epytpay; gw;wpg; goe;jkpo; .yf;fpaq;fs; %yk; mwpe;Jnfhs;sy;.</i>					Cognitive		Remember		
<b>CO3</b>	<i>Describe(tpsf;Fjy;)njhy;fhg;gpak; %yk; mwptpay; nra;jpfisczu;jy;.</i>					Cognitive Psychomotor		Understand Set		
<b>CO4</b>	<i>Apply (gad;gLj;Jjy;)gy;NtWfy;tpj;Jiwrrhu;e;jgpupTfs;&gt;gy;NtWfy;tpj;Jiwrhu;e;jgpupTfs; Fwpj;JnjspTngwy;.</i>					Cognitive		Apply		
<b>CO5</b>	<i>Analyze(gFj;jy;)mwptpay; rpWfijfspd; Njhw;wk; kw;Wk; tsu;r;rpepiyehlfq;fspd; gq;FFwpj;JnjspTngWjy;.</i>					Cognitive		Analyze		
<b>myF- 1</b>			<b>mwptpay;jkpo; mwpKfk;</b>						<b>9</b>	
mwptpay;jkpo; - nghwpapay;>njhopy;El;gk;>kUj;Jtk;>cotpay;. jkpopy; mwptpay; - jkpopy; El;gk;. gilg;Gg; gzp-nrhy;yhf;fcj;jpfs; - El;gkhdNtWghLfisczu;e;Jnrhy;yhf;fk; nra;jy; - fiyr;nrhw;fs; -										

.e;jpankhopfSf;Fg; nghJthdfiyr; nrhw;fiscUthf;Fjy; - tlnkhopNtu;r;nrhw;fiskpFjpahff; nfhz;bUj;jiyg; gad;gLj;Jjy;.					
<b>myF- 2</b>	<b>gpwmwptpay; Jiwfs;</b>			<b>9</b>	
Gtpapay;>epytpay; gw;wpgoe;jkpo; ,yf;fpak; Fwpg;gpLk; jfty;fs; - njhy;fhg;gpak; Fwpg;gpLk; capupay;>kz;zpays; gw;wpambg;gilr; nra;jpfs; - jkpo; kUj;Jtf; fy;tp - mwptpay; jkpOf;F ,jopay; cj;jpfs; - tsu; jkpo;.					
<b>myF- 3</b>	<b>gy;NtWfiyfspy; mwptpay;</b>			<b>9</b>	
nkhopapay; fy;tp-fl;llf; fiyf;fy;tp-rKjhaf;fy;tp-Nra;ikf;fy;tp-kz;zpays;>Gtpapay;>fzf;fpay; Mfpait,ize;jfy;tp - ,f;fhyf; fy;tpg; nghJepiy-fiy>mwptpay; - vd;gtw;wpd; tpsf;fq;fs;.					
<b>myF- 4</b>	<b>mwptpay; jkpopy; rpWfijfspd; gq;F</b>			<b>9</b>	
rpWfij -,yf;fzk; cUthf;Fk; cj;jpfs; - rpwe;jrpWfijfs; - rpWfij tiffs; - ey;yrpWfijeUthf;fk; - tuyhW-r%fk; - nkhopngau;g;Gkw;Wk; mwptpay; rpWfijfs;.					
<b>myF-5</b>	<b>mwptpay; jkpopy; ehlfq;fspd; gq;F</b>			<b>9</b>	
ehlfk; - ehlf ,yf;fzk;> ,Utifehlfq;fs; - gbg;gjw;Fupaehlfk; - ebg;gjw;Fupaehlfk; - rupj;jpuehlfk;>r%fehlfk; - eifr;Ritehlfq;fs; - mnkr;#u; ehlfq;fs; - njhopy;Kiwehlfq;fs;.					
<b>LECTURE</b>	<b>TUTORIAL</b>			<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>---</b>			<b>---</b>	<b>45</b>
<b>Nkw;ghu;itEhy;fs;:</b>					
1. mwptpay; jkpo; - lhf;lu; th.nr. Foe;ijr;rhkp					
2. tsu; jkpo; - ,jo;fs;					
3. ,yf;fpatuyhW-rpWfijgw;wpaJ					
4. ,yf;fpatuyhW-Gjpdk;gw;wpaJ					

**Table 1: CO Versus PO mapping.**

<b>B.Sc. A &amp; M</b>	<b>PO</b>							<b>PSO</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>2</b>
<b>CO1</b>		1							

<b>CO2</b>		1							
<b>CO3</b>		1					1		
<b>CO4</b>	1	2	2	1		1	2		
<b>CO5</b>	2	2	2	2		1	2		
<b>Total</b>	3	7	4	3		2	5		
<b>Scaled Value</b>	1	1	1	1			1		

1 – 5 -> 1    6 – 10 ->2    11 – 15 -> 3

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>COURSE CODE</b>	<b>XBC103</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>COMPUTER FUNDAMENTALS</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>4</b>
<b>PREREQUISITES</b>	<b>Nil</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>	<b>2:1:0</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>
<b>COURSE OUTCOME</b>		<b>Domain</b>		<b>Level</b>	
CO1	<i>Recognize</i> the importance of computer system, application and practice in Libre Office (FOSS) Writer.	Cognitive Psychomotor		Understand Origination	
CO2	<i>Identify</i> and <i>define</i> basic terms and concepts in computer hardware and peripheral devices and Libre Office (FOSS) Impress.	Cognitive Psychomotor		Understand Origination	
CO3	<i>Establish</i> the relationship between hardware and software. <i>Arrange</i> data and Apply formula in Libre Office (FOSS) Calc.	Cognitive Psychomotor		Apply Origination	
CO4	<i>Identify</i> the IO devices. <i>Design</i> database using Libre Office (FOSS) Base.	Cognitive Psychomotor		Remembrance Origination	
CO5	<i>Identify</i> flowchart component and <i>apply</i> in program and design a project using Libre Office (FOSS).	Cognitive		Understand	

		Psychomotor	Apply Origination
<b>UNIT I - INTRODUCTION</b>			<b>12+6</b>
Introduction – Characteristics of computer – Evolution of computer - Generation of computer – classification of computer - The Computer system –Applications of computers			
<b>Lab:</b> Libre Office Writer			
Text Processing Table Creation Resume Creation Mail Merge			
<b>UNIT II - COMPUTER ARCHITECTURE</b>			<b>12+6</b>
The Central processing unit (CPU) – Main Memory Unit – Interconnection Unit – Cache – Communication between various units of a computer system.			
<b>Lab :</b> Libre Office Calc			
Worksheet Creation Employee Pay Details Student Result Sheet Simple Charts			
<b>UNIT III - PRIMARY AND SECONDARY MEMORY</b>			<b>12+6</b>
<b>Primary memory :</b> Memory representation – memory hierarchy - Random access memory – Types of Memory – Read only memory – types of ROM – <b>Secondary Memory</b> – Classification of secondary storage devices –Magnetic tape – Magnetic disk - Optical disk – Memory stick - Universal serial bus – Mass storage devices			
<b>Lab :</b> Libre Office Impress			
Power Point Preparation Create Text And Images With Effects Create Animation And Sound Effects			
<b>UNIT IV - INPUT AND OUT PUT DEVICES</b>			<b>12+6</b>
<b>Input devices</b> Types of input devices - Optical character recognition – Optical Mark recognition - Magnetic ink character recognition – Bar code reader – <b>Output devices :</b> Types of output - Classification of output devices - Terminals			
<b>Lab :</b> Libre Office Access			
Importing Data From Data Base Creating Macro Result Processing			
<b>UNIT V</b>	<b>COMPUTER PROGRAM AND LANGUAGES</b>		<b>12+6</b>

**Computer Program :** Developing a program - Algorithm – flow chart - decision table – program testing and debugging- Program documentation – Programming paradigms - Characteristics of good program – **Computer languages :** Evolution of programming language – Classification of programming Language – Generation of a programming language – features of a good programming language

**Lab :** Libre Office Project

Creating A Greeting Card

Creating A Cover Page Of A Project

LECTURE	TUTORIAL	PRACTICAL	TOTAL
60	0	30	90

**Text books**

1. Dorling Kindersley, 2009. Introduction to Computer Science ITL Education Solutions Limited fourth Edition.

**References:**

1. Roger Hunt and John Shelly, penguin Edition .,2007. Computers and common sense, (PHI)
2. Internet for everyone, Lenon&Lenon (Lenon Tech World), 2009.

**E-References:**

3. <http://www.nptel.ac.in>
4. <http://www.vlab.co.in>

**Mapping of COs with POs**

Course Outcomes	Program Outcomes								
	1	2	3	4	5	6	7	PSO1	PSO2
CO1	2	1	1	1					
CO2			1	1					
CO3	1	2	1	1	1				
CO4	1	2	1	1	1				
CO5	1	1	1	1	2	2		1	

<b>Total</b>	<b>5</b>	<b>6</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>3</b>		<b>1</b>	
<b>Scaled Value</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>		<b>1</b>	

1-5 → 1, 6-10 → 2, 11-15 → 3

0 – No relation, 1 – Low relation, 2 – Medium relation, 3 – High relation

<b>COURSE CODE</b>	<b>XBC104</b>	L	T	P	C
<b>COURSE NAME</b>	<b>ALGEBRA, CALCULUS AND ANALYTICAL GEOMETRY</b>	4	1	0	5
<b>PREREQUISITES</b>	Basic of Mathematics	L	T	P	H
		4	1	0	5
C:P:A	<b>4:0:0</b>				
<b>COURSE OUTCOMES</b>		<b>DOMAIN</b>	<b>LEVEL</b>		
<b>CO1</b>	<i>Evaluate the derivatives of given functions</i>	Cognitive	Understand		
<b>CO2</b>	<i>Calculate the definite and indefinite integrals using various techniques.</i>	Cognitive	Understand, Remember		
<b>CO3</b>	<i>Apply basic operations on matrices to find the inverse of a matrix</i>	Cognitive	Understand, Apply		
<b>CO4</b>	<i>Solve problems using Binomial, exponential and logarithmic series expansions.</i>	Cognitive	Understand		
<b>CO5</b>	<i>Calculate the distance between two points and explain section formulae, slope form and intercept form.</i>	Cognitive	Understand		
<b>UNIT I – DIFFERENTIAL CALCULUS</b>		<b>12+3</b>			
Derivative of a function – Various formulae – Product and quotient rule of differentiation – Differentiation of function of function (chain rule) – Trigonometric functions – Inverse trigonometric functions – Exponential function – Logarithmic functions – Logarithmic differentiation - Higher derivatives – Successive differentiation – Leibnitz theorem.					
<b>UNIT II – INTEGRAL CALCULUS</b>		<b>12+3</b>			



Constant of integration – Indefinite integral – Elementary integral formulae – Methods of integration – Integration by substitution - Integration by parts – Integration through partial fractions – Concept of definite integral – Properties of definite integral.				
<b>UNIT III – MATRICES AND DETERMINANTS</b>				<b>12+3</b>
Definition and types of matrices – Matrix Operation – Determinants – Solution of system of linear equations by Matrix method.				
<b>UNIT IV – SERIES</b>				<b>12+3</b>
Binomial theorem for a rational index – Exponential and Logarithmic series – Summation of the above series.				
<b>UNIT V – TWO DIMENSIONAL ANALYTICAL GEOMETRY</b>				<b>12+3</b>
Cartesian coordinate system – Introduction to polar coordinates – Distance between two points – Section formulae – Area of triangle – Locus and its equations – Straight line: Equation of a straight line parallel to an axis – slope form –normal form – Intercept form through two point –condition of concurrency of three lines.				
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>HOURS</b>	60	15	0	75
<b>TEXT BOOKS</b>				
T. K. ManicavachagomPillay, T. Natarajan, K. S. Ganapathy, Algebra, Volume I , S.Vishvanathan Printers and Publishers Pvt., Ltd, Chennai 2004.				
2. S.Narayanan, T.K.ManicavachagomPillay, S.Vishvanathan, Calculus volume I & II Printers and Publishers Pvt., Ltd, Chennai 1991.				
<b>REFERENCES</b>				
P.Kandasamy&K.Thilagavathi, B.Sc Mathematics for branch I – Vol I &Vol II, S.Chand& Co, 2004.				
<b>E- REFERENCES</b>				
<a href="http://www.nptel.ac.in">www.nptel.ac.in</a>				
Advanced Engineering Mathematics, Prof. PratimaPanigrahi, Department of Mathematics, Indian Institute of Technology, Kharagpur.				

### Mapping of Cos with Pos:

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PSO1</b>	<b>PSO2</b>
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CO1	3						2		
CO2	3						2		
CO3	3						2		
CO4	3						2		
CO5	3						2		
Total	15						10		
Scaled Value	3						2		

1-5→1, 6-10→2, 11-15→3

0 – No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation

<b>I.3 COURSE CODE</b>			<b>XBC 105</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>			<b>PROBLEM SOLVING USING C</b>				<b>3</b>	<b>0</b>	<b>1</b>	<b>4</b>
<b>PREREQUISITE</b>			<b>Nil</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C</b>	<b>P</b>	<b>A</b>	<b>2.8:1:0.2</b>				<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>
<b>COURSE OUTCOMES</b>						<b>DOMAIN</b>		<b>LEVEL</b>		
<b>CO1</b>	<i>Recognize</i> the importance of the Structured Programming.					Cognitive Psychomotor		Remember Perception		
<b>CO2</b>	<i>Identify</i> the needs of problem solving concepts.					Cognitive Psychomotor		Understand Perception		
<b>CO3</b>	<i>Demonstrate</i> the usage of memory management and <i>BeAware</i> of the utilization of the dynamics memory allocation concepts in the real time application.					Cognitive Psychomotor Affective		Apply Perception Receive		
<b>CO4</b>	<i>Illustrate</i> the concept of sorting & searching and <i>Contribute</i> more in the team work towards application development.					Cognitive Psychomotor Affective		Apply Mechanism Respond		

<b>CO5</b>	<i>Develop</i> and <i>Establish</i> the application software in C language.	Cognitive Psychomotor	Create Origination
<b>UNIT I</b>	<b>INTRODUCTION TO C</b>		<b>9+6</b>
<p>History of C - Characteristics of C – Character set - Tokens – Identifiers – Keywords – Constants and Data Types - Operators and Expressions – Input and Output Functions – Conditional Control statements – Branching – Looping - Unconditional control structures - switch, break, continue, goto statements</p> <p><b>Lab:</b></p> <ol style="list-style-type: none"> <li>1. Programs using <u>Expression Evaluation</u></li> <li>2. Programs using <u>Branching Statements</u></li> <li>3. Programs using <u>Looping Statement</u></li> </ol>			
<b>UNIT II</b>	<b>PROBLEM SOLVING</b>	<b>12</b>	<b>9+6</b>
<p>Problem solving aspect - Top -down design - Implementation of algorithms– Program verification- Efficiency-Analysis of Algorithms–Fundamental Algorithms – swapping.</p> <p><b>Lab:</b></p> <ol style="list-style-type: none"> <li>1. Programs Using Computational Problems.</li> <li>2. Programs Using Conditional Statements.</li> </ol>			
<b>UNIT III</b>	<b>ARRAYS AND POINTERS</b>	<b>12</b>	<b>9+6</b>
<p>Arrays: One Dimensional Array – Two Dimensional – Multi Dimensional Arrays - Storage classes: auto – extern – static. Strings: Basic operations on strings. Functions: Built in functions – User Defined Functions - Parameter passing methods - Passing arrays to functions – Recursion - Pointer concept –Pointers and Functions - Call by value - Call by Reference – Pointers and Arrays - Pointers on pointer – Dynamic memory allocation- Operations on pointers.</p> <p><b>Lab:</b></p> <p>Programs using <u>Arrays</u>  Programs using <u>Functions</u>  Programs using <u>Call</u> by reference  Programs using dynamic memory allocation</p>			
<b>UNIT IV</b>	<b>FACTORING METHODS AND MERGING, SORTING AND SEARCHING</b>	<b>12</b>	<b>9+6</b>
<p>Finding Square Root - LCM - GCD Generation of Prime Numbers -Array Techniques – Histogramming - Minimum and Maximum numbers. Two- way Merge Sort - Selection Sort - Binary Search - Hash Search - Text Processing-Keyword Searching in text.</p> <p><b>Lab :</b></p>			

Program to find LCM and GCD Programs for sorting Programs for Searching Programs using Strings			
<b>UNIT V</b>	<b>STRUCTURES AND FILES</b>		<b>12</b> <b>9+6</b>
Structures and Unions -Initializing structure - Passing structure to elements to functions - Arrays of structure - Structure within a structure and Union - Pointers and structures -File management in C - Defining and opening a file - Closing a file - The getw and putw functions - The fprintf&fscanf functions - fseek function – Files and Structures -Command line arguments			
<b>Lab:</b>			
Programs using Structures Programs using Union Program using Files Program using Command line arguments			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>60</b>	<b>-</b>	<b>105</b>
<b>TEXT BOOKS</b>			
Byron Gottfried, "Programming with C", III Edition, (Indian Adapted Edition), TMHpublications, 2010. YeshwantKanethker, "Let us C", BPB Publications, 2008 Dromey R.G, 2008. "How to Solve it by Computer" Pearson Education, 5 <sup>th</sup> edition			
<b>REFERENCES</b>			
Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. (2005). Aho A.V. J.E. Hopcroft and J.D. Ullman., 2001. "The Design and Analysis of Computer Algorithms", Pearson Education Delhi. Second Edition. Sara Baase and Allen Van Gelder., 2002. "Computer Algorithms - Introduction to Design and Analysis" Pearson Education Delhi.3 <sup>th</sup> Edition.			
<b>E-REFERENCES</b>			
<a href="http://www.comptechdoc.org/basic/basiclut/index.html">http://www.comptechdoc.org/basic/basiclut/index.html</a> <a href="http://cse02-iiith.vlabs.ac.in/">http://cse02-iiith.vlabs.ac.in/</a> <a href="http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106104128">http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106104128</a> <a href="http://www.nptel.ac.in">http://www.nptel.ac.in</a> <a href="http://www.vlab.co.in">http://www.vlab.co.in</a>			

**Table 1: Mapping of Cos with POs.**

<b>B.Sc CS</b>	<b>PO</b>							<b>PSO</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>2</b>

CO1	2	2	2	2				2	1
CO2	1			2				2	
CO3	1		2	1					
CO4	2	1	2	3				2	1
CO5	2		1	3				2	
<b>Total</b>	8	3	7	11				8	2
<b>Scaled Value</b>	2	1	2	3				2	1

1 -- 5 → 1,      6 -- 10 → 2,      11--15 → 3

0–No relation 1–Low relation 2–Medium relation 3–Strong relation

<b>COURSE CODE</b>	<b>XUM106</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY</b>				<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PREREQUISITES</b>	<b>-</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>	<b>2.7:0:0.3</b>				<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>COURSE OUTCOMES</b>					<b>Domain</b>		<b>Level</b>	
<b>CO1</b>	<i>Relate</i> and <i>Interpret</i> the human ethics and human relationships				Cognitive		Remember	
<b>CO2</b>	<i>Explain</i> and <i>Apply</i> gender issues, equality and violence against women				Cognitive		Understanding, Applying	
<b>CO3</b>	<i>Classify</i> and <i>Develop</i> the identify of human rights and their violations				Cognitive & Affective		Analyzing Receiving	
<b>CO4</b>	<i>Classify</i> and <i>Dissect</i> necessity of human rights and report on violations.				Cognitive		Understanding, Analyze	
<b>CO5</b>	<i>List</i> and <b>respond</b> to family values, universal brotherhood, fight against corruption by common man and good governance.				Cognitive & Affective		Remember, (Respond)	
<b>UNIT I HUMAN ETHICS AND VALUES</b>								<b>7</b>

Human Ethics and values - Understanding of oneself and others- motives and needs- Social service, Social Justice, Dignity and worth, Harmony in human relationship: Family and Society, Integrity and Competence, Caring and Sharing, Honesty and Courage, WHO's holistic development - Valuing Time, Co-operation, Commitment, Sympathy and Empathy, Self respect, Self-Confidence, character building and Personality.		
<b>UNIT II GENDER EQUALITY</b>		<b>9</b>
Gender Equality - Gender Vs Sex, Concepts, definition, Gender equity, equality, and empowerment. Status of Women in India Social, Economical, Education, Health, Employment, HDI, GDI, GEM. Contributions of Dr.B.R. Ambedkar, Thanthai Periyar and Phule to Women Empowerment.		
<b>UNIT III WOMEN ISSUES AND CHALLENGES</b>		<b>9</b>
Women Issues and Challenges- Female Infanticide, Female feticide, Violence against women, Domestic violence, Sexual Harassment, Trafficking, Access to education, Marriage. Remedial Measures – Acts related to women: Political Right, Property Rights, and Rights to Education, Medical Termination of Pregnancy Act, and Dowry Prohibition Act.		
<b>UNIT IV HUMAN RIGHTS</b>		<b>9</b>
Human Rights Movement in India – The preamble to the Constitution of India, Human Rights and Duties, Universal Declaration of Human Rights (UDHR), Civil, Political, Economical, Social and Cultural Rights, Rights against torture, Discrimination and forced Labor, Rights and protection of children and elderly. National Human Rights Commission and other statutory Commissions, Creation of Human Rights Literacy and Awareness. - Intellectual Property Rights (IPR). National Policy on occupational safety, occupational health and working environment.		
<b>UNIT V GOOD GOVERNANCE AND ADDRESSING SOCIAL ISSUES</b>		<b>11</b>
Good Governance - Democracy, People's Participation, Transparency in governance and audit, Corruption, Impact of corruption on society, whom to make corruption complaints, fight against corruption and related issues, Fairness in criminal justice administration, Government system of Redressal. Creation of People friendly environment and universal brotherhood.		
	<b>LECTURE</b>	<b>TOTAL</b>
	<b>45</b>	<b>45</b>
<b>Textbook</b>		
Aftab A, (Ed.), Human Rights in India: Issues and Challenges, (New Delhi: Raj Publications, 2012).		
Mani. V. S., Human Rights in India: An Overview (New Delhi: Institute for the World Congress on Human Rights, 1998).		
Singh, B. P. Sehgal, (ed) Human Rights in India: Problems and Perspectives (New Delhi: Deep and Deep, 1999).		
Veeramani, K. (ed) Periyar on Women Right, (Chennai: Emerald Publishers, 1996)		
Veeramani, K. (ed) Periyar Feminism, (Periyar Maniammai University, Vallam, Thanjavur: 2010).		
<b>REFERENCE BOOKS</b>		
Bajwa, G.S. and Bajwa, D.K. Human Rights in India: Implementation and Violations (New Delhi: D.K. Publications, 1996).		

Chatrath, K. J. S., (ed.), Education for Human Rights and Democracy (Shimala: Indian Institute of Advanced Studies, 1998).

Jagadeesan. P. Marriage and Social legislations in Tamil Nadu, Chennai: Elachiapen Publications, 1990).

Kaushal, Rachna, Women and Human Rights in India (New Delhi: Kaveri Books, 2000)

**E-REFERENCE**

1. Planning Commission report on Occupational Health and Safety  
[http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg\\_occup\\_safety.p](http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p)  
 Central Vigilance Commission (Gov. of India) website: <http://cvc.nic.in/welcome.html>.  
 Weblink of T ransparency International: <https://www.transparency.org/>  
 Weblink Status report: <https://www.hrw.org/world-report/2015/country-chapters/india>

**Mapping of COs with POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
<b>CO1</b>					2	2	1			
<b>CO2</b>					2	2				
<b>CO3</b>						2				
<b>CO4</b>						2	1			
<b>CO5</b>						3				
<b>Total</b>					4	11	2			
Scaled Value					1	2	1			

1 – 5 → 1, 6-10 → 2, 11 – 15 → 3

0 – No relation, 1 – Low relation, 2 – Medium relation, 3 – High relation

<b>1.4 XGL2 01</b>			<b>ENGLISH FOR EFFECTIVE COMMUNICATION</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
								<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>1.5</b>	<b>0</b>	<b>0.5</b>						<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>PREREQUISITE:</b> Nil												
<b>COURSE OUTCOMES</b>							<b>DOMAIN</b>			<b>LEVEL</b>		

<b>On the successful completion of this course students would be able to</b>			
<b>CO1</b>	Ability to <b>identify</b> the features of a technical project report and Knowledge on the linguistic competence to write a technical report	Cognitive	Creating
<b>CO2</b>	Ability to <b>integrate</b> both technical COURSE skill and language skill to write a project.	Cognitive	Understand
<b>CO3</b>	Confidence to <b>present</b> a project in 10 to 15 minutes	Cognitive	Create
<b>CO4</b>	The learner <b>identifies</b> and absorbs the pronunciation of sounds in English Language and learns how to mark the stress in a word and in a sentence properly	Cognitive	Create
<b>CO5</b>	The program enables the speaker speaks clearly and fluently with confidence and it trains the learner to listen actively and critically.	Psychomotor	Perception
<b>UNIT I</b>			<b>9</b>
Basic principles of good technical writing, Style in technical writing, out lines and abstracts, language used in technical writing: technical words, jargons etc			
<b>UNIT II</b>			<b>12</b>
Special techniques used in technical writing: Definition, description of mechanism, Description of a process, Classifications, division and interpretation			
<b>UNIT III</b>			<b>9</b>
Report/ project layout the formats: chapters, conclusion, bibliography, annexure and glossary, Graphics aids etc - Presentation of the written project 10 – 15 minutes			
<b>UNIT IV</b>			<b>9</b>
Sounds of English Language; vowels, consonants, diphthongs , word stress, sentence stress, intonation patterns, connected speech etc. - Vocabulary building – grammar, synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, idioms and phrases.			
<b>UNIT V</b>			<b>12</b>
Reading comprehension – reading for facts, meanings from context, scanning, skimming, inferring meaning, critical reading, active listening, listening for comprehension etc.			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>30</b>	<b>30</b>	<b>-</b>	<b>60</b>
<b>REFERENCES:</b>			
<b>1.</b> Technical Writing – April, 1978, by <a href="#">Gordon H. Mills</a> (Author), <a href="#">John A. Walter</a>			



2. <b>Effective Technical Communication:</b> A guide for scientists and Engineers. Author: Barun K. Mitra, Publication: Oxford University press. 2007									
<b>Software for lab: English Teaching software</b> (Young India Films)									
<b>1.5 XES202</b>			<b>ENVIRONMENTAL STUDIES</b>		L	T	P	SS	C
					2	0	0	1	0
1.6	P	A			L	T	P	SS	H
1.7	0	0.5			2	0	0	1	3
<b>PREREQUISITE : Nil</b>									
Course Outcomes					Domain		Level		
After the completion of the course, students will be able to									
CO1	<i>Describe</i> the significance of natural resources and <i>explain</i> anthropogenic impacts.				Cognitive			Remember Understand	
CO2	<i>Illustrate</i> the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.				Cognitive			Understand	
CO3	<i>Identify</i> the facts, consequences, preventive measures of major pollutions and <i>recognize</i> the disaster phenomenon				Cognitive Affective			Remember Receiving	
CO4	<i>Explain</i> the socio-economic, policy dynamics and <i>practice</i> the control measures of global issues for sustainable development.				Cognitive			Understand AnalXBC	
CO5	the impact of population and the concept of various welfare programs, and <i>apply</i> themodern technology towards environmental protection.				Cognitive			Understand Apply	
<b>UNIT I</b>		<b>INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY</b>					<b>12</b>		
Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, flood, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food									

resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

<b>UNIT II</b>	<b>ECOSYSTEMS AND BIODIVERSITY</b>	<b>7</b>
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Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

<b>UNIT III</b>	<b>ENVIRONMENTAL POLLUTION</b>	<b>10</b>
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Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: flood, earthquake, cyclone and landslide.

<b>UNIT IV</b>	<b>SOCIAL ISSUES AND THE ENVIRONMENT</b>	<b>10</b>
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Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

<b>UNIT V</b>	<b>HUMAN POPULATION AND THE ENVIRONMENT</b>	<b>6</b>
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Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education - HIV / AIDS – Women and Child welfare programme– Role of Information Technology in Environment and human health – Case studies.

<b>Lecture: 30</b>	<b>Self-Study: 15</b>	<b>Practical:0</b>	<b>Total:45</b>
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**Text book**

Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, 2000.  
Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, 2003

**Reference Books**

Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, 2003.  
 Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, 2006.  
 Introduction to International disaster management, Butterworth Heinemann, 2006.  
 Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, 2004.  
 Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, 2009.  
 Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.  
 S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, 2012.  
 Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, 2003.  
 Sundar, Disaster Management, Sarup& Sons, New Delhi, 2007.  
 G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, 2006.

**E-references**

<http://www.e-booksdirectory.com/details.php?ebook=10526>  
<https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science>  
<https://www.free-ebooks.net/ebook/What-is-Biodiversity>  
[https://www.learner.org/courses/envsci/unit/unit\\_vis.php?unit=4](https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4)  
<http://bookboon.com/en/pollution-prevention-and-control-ebook>  
<http://www.e-booksdirectory.com/details.php?ebook=8557>  
<http://www.e-booksdirectory.com/details.php?ebook=6804>

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
<b>CO1</b>	2						2		2	2
<b>CO2</b>	1						2			2
<b>CO3</b>	2	1	2				3		2	3
<b>CO4</b>	2	2	2				2			3
<b>CO5</b>	2				3	3				2
	<b>9</b>	<b>3</b>	<b>4</b>		<b>3</b>	<b>3</b>	<b>9</b>		<b>4</b>	<b>12</b>
<b>Scaled to 0,1,2,3 scale</b>	<b>2</b>	<b>1</b>	<b>1</b>		<b>1</b>	<b>1</b>	<b>2</b>		<b>1</b>	<b>3</b>

<b>XBC203</b>	<b>PROGRAMMING IN C++</b>							<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
								<b>3</b>	<b>0</b>	<b>1</b>	<b>4</b>

<b>C</b>	<b>P</b>	<b>A</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.5</b>	<b>0</b>	<b>0.5</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>
<b>PREREQUISITE: Problem Solving Using C</b>						
<b>Course Outcomes</b>			<b>Domain</b>		<b>Level</b>	
After the completion of the course, students will be able to						
<b>CO1</b>	<i>Recognize</i> the importance of object oriented programming		Cognitive Psychomotor	Remember Perception		
<b>CO2</b>	<i>Memorize</i> the knowledge of data abstraction, encapsulation and inheritance.		Cognitive Affective	Understand Receive		
<b>CO3</b>	<i>Develop</i> the solution to the Complex problems.		Cognitive	Analyze		
<b>CO4</b>	<i>Implement</i> good programming design methods for program development.		Cognitive Affective	Apply Respond		
<b>CO5</b>	<i>Recognize</i> the consequence of exception handling.		Cognitive Psychomotor	Understand Set		
<b>UNIT I</b>	<b>INTRODUCTION</b>					<b>12</b>
Principles of Object Oriented Programming - Object Oriented Programming paradigm - Basic concepts of Object Oriented Programming - Benefits of OOP - Object Oriented languages - applications of OOP - Beginning with C++ - Tokens, Variables, Identifiers, Expressions and Control Structure – Branch and loop.						
<b>UNIT II</b>	<b>FUNCTIONS</b>					<b>12</b>
Functions in C++ - Function Prototyping - Call by Reference - Return by Reference - Inline Functions – Default Arguments – Arrays in function - Function Overloading – Friend and virtual Functions – Console Input/Output – Programmer define functions – Scope rules.						
<b>UNIT III</b>	<b>CONSTRUCTORS AND DESTRUCTORS OPERATOR OVERLOADING</b>					<b>12</b>
Constructors and Destructors – Introduction – Constructors- Copy Constructor, Dynamic Constructors - Destructors. Introduction – Defining Operator Overloading - Overloading Unary Operators - Overloading Binary Operators.						

<b>UNIT IV</b>	<b>CLASSES AND OBJECTS, INHERITANCE AND POLYMORPHISM</b>			<b>12</b>
Classes and Objects - Inheritance: Introduction - Defining Derived Classes - Single Inheritance - Multilevel Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance - Virtual Base Classes - Abstract Classes, Constructors in Derived Classes - Member Classes: Nesting of Classes. Pointers to Objects – Pointers to Derived Classes – Virtual Functions - Polymorphism				
<b>UNIT V</b>	<b>EXCEPTION HANDLING AND FILES</b>			<b>12</b>
Exception Handling: Introduction – Basics of exception Handling –Exception Handling Mechanism – Throwing and Catching Mechanism – Rethrowing an Exceptions – Specifying Exceptions – Files – Operation on files.				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>	
<b>45</b>		<b>30</b>	<b>75</b>	
<b>TEXT BOOKS</b>				
1. Ira Pohl, 2004. “Object Oriented Programming using C++”, 2 <sup>nd</sup> Edition Reprint, Pearson Education. 2. Stroustrup,B.,2004.“The C++ Programming language”, 3 <sup>rd</sup> edition, Pearson Education.				
<b>REFERENCES</b>				
Herbert Schild, 2004 “The complete reference C++” 4 <sup>th</sup> edition McGraw Hill				
<b>E-REFERNCE</b>				
<a href="https://www.tutorialspoint.com/cplusplus/">https://www.tutorialspoint.com/cplusplus/</a> <a href="http://www.cprogramming.com/tutorial/c++-tutorial.html">www.cprogramming.com/tutorial/c++-tutorial.html</a>				

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

<b>B.Sc CS</b>	<b>PO</b>							<b>PSO</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>2</b>
<b>CO1</b>	2	1	1	1	1	2	1	1	1
<b>CO2</b>	3	2	2	2	2	2	2	2	1
<b>CO3</b>	2	2	2	2	3	2	2	2	1
<b>CO4</b>	3	2	2	2	2	2	2	3	1

<b>CO5</b>	3	3	3	3	3	3	3	3	1
<b>Average</b>	3	2	2	2	2	2	2	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>COURSE CODE</b>	<b>XBC204</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>DISCRETE MATHEMATICS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>PREREQUISTE</b>	<b>NIL</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>	<b>3:0:0</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Course Outcome</b>		<b>Domain</b>		<b>Level</b>	
<b>CO1</b>	<i>Define</i> the properties and laws of sets, relations and functions and <i>Apply</i> the operation of the sets using venn Diagram.	<b>Cognitive</b>		R, A <sub>p</sub>	
<b>CO2</b>	<i>Apply</i> the concepts of logic and to find the normal forms. <i>Explain</i> the tautologies and Contradiction.	<b>Cognitive</b>		U, A <sub>p</sub>	
<b>CO3</b>	<i>Apply</i> the counting principle permutation and combination and to <i>solve</i> the problem. <i>Explain</i> the pigeonhole principle.	<b>Cognitive</b>		U, A <sub>p</sub>	
<b>CO4</b>	<i>Explain</i> the types of lattices and to <i>show</i> lattices as partially ordered sets.	<b>Cognitive</b>		U, A <sub>p</sub>	
<b>CO5</b>	<i>Apply</i> the properties of semi groups and groups and <i>Explain</i> any set with binary operation as a semigroup and group with examples.	<b>Cognitive</b>		U, A <sub>p</sub>	
<b>UNIT I</b>					<b>12</b>
Set notations – Basic definitions and set operations – Venn diagram – Algebraic laws of set theory – D Morgan’s law. Relations: Properties of relations – Types of relations – Equivalence classes. Functions: Definition – Domain – Range and types of function- Classification of function.					
<b>UNIT II</b>					<b>12</b>
Statements - Normal forms – CNF – DNF – PCNF - PDN – Tautologies - Contradictions.					
<b>UNIT III</b>					<b>12</b>

Counting principles – The Pigeonhole principle – Counting – Permutations and Combinations – Combinatorial arguments – Countable and uncountable sets.			
<b>UNIT IV</b>			<b>12</b>
Lattices as partially ordered set – Types of lattices – Lattices as algebraic system.			
<b>UNIT V</b>			<b>12</b>
Binary operations – Semi groups - Groups – Examples and elementary properties.			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>15</b>	<b>--</b>	<b>60</b>
<b>TEXT BOOK</b>			
Ralph. P. Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fourth Edition, Pearson Education Asia, Delhi, 2002. Kenneth Levasseur and Alan Doerr, “Applied Discrete Structures, Department of Mathematical Sciences, University of Massachusetts Lowell, Version 2.0, 2013.			
<b>REFERENCES</b>			
Kenneth H.Rosen, “Discrete Mathematics and its Application”, Fifth edition, Tata McGraw-Hill Publishing company pvt.Ltd., New Delhi, 2003. Dr.M.K.Venkataraman, Dr.N.SridharanN.Chandrasekaran, “Discrete Mathematics”, the National Publishing Company, 2003. Veerajan T., Discrete Mathematics with Graph Theory and Combinatorics”, 10th edition,Tata McGraw Hill Companies,2010.			
<b>E REFERENCES</b>			
<a href="http://www.nptel.ac.in">www.nptel.ac.in</a> Graph Theory A NPTEL Course S.A. Choudum. Graph Theory by Prof. L. Sunil Chandran Computer Science and Automation Indian Institute of Science, Bangalore.			

### Mapping of CO's with PO's:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
<b>CO1</b>	<b>3</b>	<b>1</b>				<b>1</b>		<b>1</b>
<b>CO2</b>	<b>3</b>	<b>1</b>	<b>1</b>			<b>1</b>		<b>1</b>
<b>CO3</b>	<b>3</b>		<b>1</b>			<b>1</b>		<b>1</b>
<b>CO4</b>	<b>3</b>					<b>1</b>	<b>1</b>	<b>1</b>
<b>CO5</b>	<b>3</b>					<b>1</b>	<b>1</b>	<b>1</b>

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>XBC205</b>			<b>COMPUTER ARCHITECTURE</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2</b>	<b>1</b>	<b>0</b>					<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>PREREQUISITE:</b> Computer fundamentals.										
<b>Course Outcomes.</b>					<b>Domain</b>		<b>Level</b>			
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Recognize</i> the operation of functional units of a computer				Cognitive Psychomotor		Knowledge			
<b>CO2</b>	<i>Describe</i> the computational operation of hardware units associated with a computing device.				Cognitive		Comprehension			
<b>CO3</b>	<i>Demonstrate</i> the operation of processing unit.				Cognitive Psychomotor		Application			
<b>CO4</b>	<i>Compare</i> the performance of different types of memory				Cognitive		Analyze			
<b>CO5</b>	<i>Recognize</i> the operation of interfacing devices.				Cognitive		Knowledge			
<b>UNIT I</b>			<b>BASIC STRUCTURE OF COMPUTERS</b>					<b>9</b>		
Functional Units - Bus Structures - Performance - Evolution - Machine Instructions and programs - Memory operations - Instruction and instruction sequencing - addressing modes - Basic I/O operations - stacks and queues - subroutines - Encoding of Machine instructions.										
<b>UNIT II</b>			<b>ARITHMETIC UNIT</b>					<b>9</b>		
Arithmetic - Design of fast adders - Binary Multiplication - Division - Floating point numbers and operations.										
<b>UNIT III</b>			<b>BASIC PROCESSING UNIT</b>					<b>9</b>		



Processing unit - Fundamental concepts - Execution of a complete instruction - Multiple bus organization - Hardwired control – Micro programmed control - pipelining - Basic concepts - Hazards - Inference on instruction sets. Data path and control considerations - Performance issues.			
<b>UNIT IV</b>	<b>MEMORY SYSTEM</b>		<b>9</b>
RAM and ROM - Cache memories - Performance considerations - Virtual memories – secondary storage devices - Associative memories.			
<b>UNIT V</b>	<b>INPUT / OUTPUT ORGANIZATION</b>		<b>9</b>
Accessing I/O devices - Interrupts - DMA - Buses - Interface circuits - standard I/O Interfaces. Case study of one RISC and one CISC processor.			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>15</b>		<b>60</b>
<b>TEXT BOOK</b>			
<ol style="list-style-type: none"> <li>1. Carl Hamacher, Zvonko Uranesic, Safvat Zaby., 2002. “Computer Organisation”, 5th edition, McGraw Hill.</li> <li>2. John P Hayes, “Computer Architecture and Organisation”, 3rd edition, McGraw Hill .</li> </ol>			
<b>REFERENCES</b>			
<ol style="list-style-type: none"> <li>1. David A Patterson and John L. Hennessy, 2002. “ Computer Organization and Design The Hardware / Software Interface”, 2nd edition, Harcourt Asia, Morgan Kaufmann.</li> </ol>			
<b>E REFERENCE</b>			
<ol style="list-style-type: none"> <li>1. <a href="http://www.tutorialspoint.com/computer_logical_organization/">www.tutorialspoint.com/computer_logical_organization/</a></li> <li>2. <a href="http://nptel.ac.in/courses/106106092/">nptel.ac.in/courses/106106092/</a></li> </ol>			

#### Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	2	1	1	1	1	2	1	1	2
<b>CO2</b>	3	2	2	2	2	2	2	1	3
<b>CO3</b>	2	2	2	2	3	2	2	1	2
<b>CO4</b>	3	2	2	2	2	2	2	1	3
<b>CO5</b>	3	3	3	3	3	3	3	1	3

<b>Average</b>	3	2	2	2	2	2	2	1	3
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3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>XBC206</b>			<b>DIGITAL ELECTRONICS</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>1</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.5</b>	<b>0.5</b>	<b>0.5</b>					<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>
<b>PREREQUISITE: NIL</b>										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Know</i> the numerical values in various number systems and perform number conversions between different number systems.					Cognitive Psychomotor		Understand		
<b>CO2</b>	<i>Demonstrate</i> the operation of logic gates, Boolean algebra including algebraic manipulation/simplification, application of DeMorgan’s theorems and Karnaugh map reduction method.					Cognitive Psychomotor		Understand Apply		
<b>CO3</b>	<i>Identify, Analyze</i> and <i>Design</i> combinational circuits					Cognitive Psychomotor		Understand Apply		
<b>CO4</b>	<i>Analyze</i> and <i>Design</i> sequential digital circuits like flip-flops, registers, counters					Cognitive Psychomotor		Understand Apply		
<b>CO5</b>	<i>Explain</i> the architecture of the Intel 8085 microprocessor for its various applications and <i>Understand</i> 8085 instruction set and develop simple programmes and practice					Cognitive		Understand		
<b>UNIT I</b>			<b>NUMBER SYSTEMS AND MINIMIZATION TECHNIQUES</b>						<b>12</b>	

Binary, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD – 2421 - Gray code-Excess 3 code-ASCII –Error detecting code – conversion from one code to another- Logic Gates : AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR- Implementations of Logic Functions using gates, NAND –NOR implementations

**Lab :**Logic gates - verification

<b>UNIT II</b>	<b>BOOLEAN ALGEBRA &amp; SIMPLIFICATION</b>	<b>12</b>
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Boolean Algebra – Basic Theorems and properties – Boolean Functions – Canonical and Standard Forms – Karnaugh Map Simplification – Two, Three Variables – NAND and NOR Implementation – Don't Care Conditions.

**Lab :** Application of Boolean functions

<b>UNIT III</b>	<b>COMBINATIONAL CIRCUITS</b>	<b>12</b>
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Combinational Circuits – Adder - Subtractor – Design and Analysis procedures – Binary Parallel Adder – Decimal Adder – Encoder – Decoder – Multiplexer – Demultiplexer – Magnitude comparators – Read Only Memory (ROM) – Programmable Logic Array(PLA).

**Lab :** Applications of combinational circuits

<b>UNIT IV</b>	<b>SEQUENTIAL CIRCUIT</b>	<b>12</b>
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Sequential circuits – Latches – Flip-flops – Triggering of Flip-Flops – Analysis of clocked sequential circuits – State reduction and state assignment – Design procedure of clocked sequential circuits – Design of counters – Registers – Shift registers – Ripple counter and Synchronous counter.

**Lab:** Design and verify the circuits of Flip Flops, Registers and counters

<b>UNIT V</b>	<b>MEMORIES</b>	<b>12</b>
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Classification of memories –RAM organization – Write operation –Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM –EEPROM –EAPROM –Programmable Logic Devices

**Lab :**Verification of timing waveforms

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	--	30	75
TEXT BOOK			

1. M. Morris Mano, "Digital Design", 3<sup>rd</sup> Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. John .M Yarbrough, "Digital Logic Applications and Design", Thomson- Vikas publishing house, New Delhi, 2002.
3. Microprocessor Architecture Programming and Application, Ganonker, Ramesh, PHI Learning, New Delhi.

**REFERENCES:**

1. Salivahanan and S. Arivazhagan, "Digital Circuits and Design", 2<sup>nd</sup> Edition, Vikas Publishing House Pvt. Ltd New Delhi, 2004
2. Charles H.Roth. "Fundamentals of Logic Design", Thomson Publication Company, 2003.
3. Donald P.Leach and Albert Paul Malvino, "Digital Principles and applications", 5<sup>th</sup> Edition., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.

**E-References:**

1. [www.tutorialspoint.com/computer\\_logical\\_organization/pdf/quick\\_guide.pdf](http://www.tutorialspoint.com/computer_logical_organization/pdf/quick_guide.pdf)
2. [www.vlab.co.in/ba\\_labs\\_all.php?id=1](http://www.vlab.co.in/ba_labs_all.php?id=1)
3. [www.nptel.ac.in/video.php?subjectId=117105080](http://www.nptel.ac.in/video.php?subjectId=117105080)
4. <https://www.youtube.com/watch?v=CeD2L6KbtV>

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc.	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	1	1	0	1	0	1	1
CO2	0	1	3	2	0	2	0	2	2
CO3	1	2	3	0	0	2	0	2	2
CO4	1	2	3	1	0	2	0	1	2
CO5	0	3	0	1	0	2	0	1	2
Average	1	2	2	1	0	2	0	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XBC301			MULTIMEDIA SYSTEMS				L	T	P	C
							3	0	2	5
C	P	A					L	T	P	H

2	1	0		3	0	2	5
<b>PREREQUISITE:</b> XBC103							
<b>Course Outcomes</b>				<b>Domain</b>	<b>Level</b>		
After the completion of the course, students will be able to							
<b>CO1</b>	<i>Identify</i> and <i>describe</i> the Multimedia components, various html tags, Image editing open source software tools			Cognitive	Understand		
<b>CO2</b>	<i>Create</i> webpage with necessary image document (text) and animation and practice in HTML.			Cognitive Psychomotor	Understand Application Set		
<b>CO3</b>	Gain a working knowledge and <i>develop</i> their skills in editing and altering photographs.			Cognitive	Understand Application		
<b>CO4</b>	Students can <i>renovate</i> the damaged photos. And export the files with various formats and printing devices.			Cognitive Psychomotor	Understand Analyze Set		
<b>CO5</b>	Students can <i>draw</i> and <i>develop</i> short clips and banners with animation using flash and create Audio files. Using html image editing and 2D animation software, can <i>develop</i> and <i>deploy</i> a complete web site in internet.			Cognitive Psychomotor	Understand Create Set		
<b>UNIT I</b>	<b>MULTIMEDIA SYSTEMS DESIGN</b>					<b>6+6</b>	
<p><b>Introduction</b> – Multimedia applications and its impact – Multimedia System Architecture – Network architecture for multimedia. Evolving technologies for Multimedia–HDTV-UDTV-3D technologies and digital signal processing. Defining objects for Multimedia systems-Text-image – Audio and Video, Audio-recording</p> <p><b>Lab Experiments Using Image Editing Tools</b></p>							
<b>UNIT II</b>	<b>Image Editing –Basics</b>					<b>6+6</b>	
<p>Introduction about Image Editor- Navigating - Menus and panels-<b>Working with Images</b>-Zooming &amp;Panning an Image-Working with Multiple Images, Rulers, Guides &amp; Grids- Undoing Steps with History- Adjusting Color with the New Adjustments Panel-The New Masks Panel - The New Note Tool &amp; the Save for Web &amp; Devices Interface- The New Auto-Blend &amp; Auto-Align Layers Commands- The New 3D Commands-<b>Resizing &amp; Cropping Images</b>- Understanding Pixels &amp;</p>							

Resolution-The Image Size Command-Interpolation Options-Resizing for Print & Web-Cropping & Straightening an Image- Adjusting Canvas Size & Canvas Rotation.

**Lab Experiments Using Image Editing Tools**

<b>UNIT III</b>	<b>Image and Text Editing- Layers</b>	<b>6+6</b>
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**Layers** -Background Layer- Creating, Selecting, Linking & Deleting Layers- Locking & Merging Layers-Copying Layers, Using Perspective & Layer Styles- Filling & Grouping Layers- Introduction to Blending Modes-Blending Modes, Opacity & Fill Creating & Modifying Text

**Lab Experiments Using Image Editing Tools**

<b>UNIT IV</b>	<b>Image and Text Editing- Effects</b>	<b>6+6</b>
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**Photo Retouching** -The Red Eye Tool-The Clone Stamp Tool- The Patch Tool & the Healing Brush Tool-**Color Correction**:-Adjusting Levels-Adjust Curves-**Creating Special Effects**- Getting Started with Filters-Creating Text Effects- Applying Gradients to Text-**Exporting**- Saving with Different File Formats-Saving for Web & Devices-Printing Options

**Lab Experiments Using Image Editing Tools**

<b>UNIT V</b>	<b>2D Animation</b>	<b>6+6</b>
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Exploring the 2D environment – working with images - basic drawing and selection – shapes – color – text – layers – scene and frame label – symbol and instance – animation

**Lab Experiments Using 2D Animation Tools**

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>30</b>	<b>-</b>	<b>30</b>	<b>60</b>

<b>TEXT BOOK</b>		
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- 1.Prabat K Andleigh and KiranThakrar, “Multimedia Systems and Design”, PHI Resent, 2003.
- 2.R.Lavanya, HTML 5, Ane Books Pvt. Ltd, 2011”
- 3.JudithJeffcoate, “Multimedia in practice technology and Applications”, PHI,1998.

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1. Adobe Photoshop CS 2 - One on One (2005 edition) by Deke McClelland  
Macromedia Flash MX 2004: The Complete Reference by Brian Underdahl
2. Foley, Vandam, Feiner, Huges, 2003. "Computer Graphics: Principles & Practice", Pearson Education, second edition .
3. PhotoShopCS for digital photographers by Colin Smith Publisher: Charles River Media. 1st edition .
4. ActionScript for Flash MX: The Definitive Guide, 2nd Edition By Colin Mook.

## E-REFERENCES:

1. <https://www.youtube.com/watch?v=ZGXS5HoBYAQ>
2. <https://www.youtube.com/watch?v=spoJ7Z8LzW8>
3. [www.tutorialspoint.com/listtutorials/multimedia/1](http://www.tutorialspoint.com/listtutorials/multimedia/1)
4. <http://www.vlab.co.in>

### Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	2	2	2	2	1	1	2	2
CO2	2	3	2	1	1	1	1	2	2
CO3	2	2	3	1	2	1	1	3	2
CO4	2	3	1	1	1	1	1	2	2
CO5	2	1	1	2	2	1	1	2	2
Average	2	2	2	1	2	1	1	2	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>Course Code</b>	<b>XBC 302</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>Course Name</b>	<b>Operating Systems</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Prerequisite</b>	<b>XBC103</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>	<b>3:0:0</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Course Outcomes</b>		<b>Domain</b>		<b>Level</b>	
After the completion of the course, students will be able to					
<b>CO1</b>	<i>Identifying</i> the functional architecture of an operating system.	Cognitive		Remember	
<b>CO2</b>	Ability to explain the best CPU scheduling algorithms and Calculate scheduling problems	Cognitive		Understand Apply	
<b>CO3</b>	Ability to <i>express various</i> memory management techniques and calculate paging problems.	Cognitive		Understand Apply	
<b>CO4</b>	Indicate the importance of file system various Operating Systems.	Cognitive		Understand	
<b>CO5</b>	<i>Classify</i> functionality I/O system of an operating system	Cognitive		Understand	
<b>UNIT I</b>	<b>OVERVIEW OF AN OPERATING SYSTEM</b>				<b>9+3</b>
Introduction to operating systems – review of computer organization – operating system structures – system calls – system programs – system structure – virtual machines. Processes: Process concept – Process scheduling – Operations on processes –Cooperating processes – Interposes communication – communication in client-server systems.					
<b>UNIT II</b>	<b>PROCESS SCHEDULING AND SYNCHRONIZATION</b>				<b>9+3</b>
CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling –. Process Synchronization: The critical-section problem –Synchronization hardware – Semaphores – Classic problems of synchronization –critical regions –Deadlock: System model – Deadlock characterization –Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance –Deadlock detection – Recovery from deadlock.					
<b>UNIT III</b>	<b>STORAGE MANAGEMENT</b>				<b>9+3</b>
Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background –Demand paging – Process creation – Page replacement – Allocation of frames –Thrashing..					



<b>UNIT IV</b>	<b>FILE SYSTEMS</b>			<b>9+3</b>
File-System Interface: File concept – Access methods – Directory structure – File system mounting – Protection. File-System Implementation: Directory implementation – Allocation methods – Free-space management – efficiency and performance – recovery – log-structured file systems.				
<b>UNIT V</b>	<b>I/O SYSTEMS</b>			<b>9+3</b>
I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem –streams – performance. Mass-Storage Structure: Disk scheduling – Disk management –Swap-space management – RAID – disk attachment – stable storage – tertiary storage.				
<b>LECTURE</b>		<b>TUTORIAL</b>		<b>PRACTICAL</b>
<b>45</b>		<b>15</b>		<b>-</b>
				<b>TOTAL</b>
				<b>60</b>
<b>Text book</b>				
1.Harvey M. Deital.2004. Operating Systems. Third Edition.US. Pearson Education.				
2.W. Stallings.2011.Operating Systems. Seventh Edition. US: Prentice Hall..				
<b>E-References</b>				
NPTEL Evidence, 2009. <i>IISc Bangalore</i> . [Online] Available at: <a href="http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Operating%20Systems/New_index1.html">http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Operating%20Systems/New_index1.html</a> <a href="http://nptel.iitg.ernet.in/Comp_Sci_Engg/IISc%20Bangalore/Operating%20Systems.htm">http://nptel.iitg.ernet.in/Comp_Sci_Engg/IISc%20Bangalore/Operating%20Systems.htm</a>				

### CO Versus PO mapping.

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3	2	1						2
<b>CO2</b>	2	1	2	2			2		2
<b>CO3</b>	2	2	1				2		3
<b>CO4</b>	2	2	1						
<b>CO5</b>	2	1				1			1
<b>Total</b>	11	8	5	2		1	2		8
<b>Scaled Value</b>	3	2	1	1		1	1		2

**0-No relation    1– Low relation    2- Medium relation    3- Highly relation**

<b>XBC303</b>			<b>PROGRAMMING IN JAVA</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2</b>	<b>2.8</b>	<b>0.2</b>					<b>3</b>	<b>0</b>	<b>4</b>	<b>7</b>
<b>PREREQUISITE: XBC105</b>										
<b>COURSE OUTCOMES</b>					<b>DOMAIN</b>		<b>LEVEL</b>			
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Recognize</i> the importance of the Object Oriented Programming.				Cognitive Psychomotor		Remember Perception			
<b>CO2</b>	<i>Identify</i> and <i>Achieve</i> the Java Programming concepts and the relationships among them.				Cognitive Psychomotor		Understand Set			
<b>CO3</b>	<i>Illustrate</i> and <i>practice</i> the usage of Arrays, Interface and Packages and also <i>Be Aware</i> of the utilization of the concepts in the real time application.				Cognitive Psychomotor Affective		Apply Guided Response Receive			
<b>CO4</b>	<i>Demonstrate</i> the concept of Multithreaded Programming and Exception Handling and <i>Contribute</i> more in the team work towards application development.				Cognitive Psychomotor Affective		Apply Mechanism Respond			
<b>CO5</b>	<i>Develop</i> and <i>Maintain</i> the Java application software.				Cognitive Psychomotor		Create Complete Overt Response			
<b>UNIT I</b>			<b>INTRODUCTION</b>				<b>9+12</b>			
Fundamentals of Object Oriented Programming – Java Evolution – Overview of Java Language – Constants, Variables and Data Types – Operators and Expressions – Decision Making and Branching – Decision Making and Looping										

<b>Lab</b>		
1. Simple Java Programs		
2. Decision Making, Branching and Looping		
<b>UNIT II</b>	<b>CLASSES, OBJECTS AND METHODS</b>	<b>9+12</b>
Introduction – Defining a Class – Adding Variables – Adding Methods – Creating Objects – Accessing Class Members – Constructors – Method Overloading – Static Members – Nesting of Methods – Inheritance – Overriding Methods – Final Variables and Methods – Final Classes – Finalizer Methods – Abstract Methods and Classes – Visibility Control		
<b>Lab</b>		
3. Constructors and Method Overloading		
4. Inheritance and Method Overriding		
<b>UNIT III</b>	<b>ARRAYS, INTERFACE AND PACKAGES</b>	<b>9+12</b>
Arrays - One-Dimensional Array – Creating an array – Two-Dimensional Array – Strings – Vectors – Wrapper Classes – Interfaces: Multiple Inheritance – Packages		
<b>Lab</b>		
Arrays and Strings		
Interfaces and Packages		
<b>UNIT IV</b>	<b>MULTITHREADED PROGRAMMING</b>	<b>9+12</b>
Creating Threads – Extending the Thread Class – Stopping and Blocking a Thread – Life Cycle of a Thread – Using Thread Methods – Thread Exceptions – Thread Priority – Synchronization – Implementing the ‘Runnable’ Interface – Managing Errors and Exceptions – Types of Errors – Exceptions – Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions		
<b>Lab</b>		
Multi Threading		
Exception Handling		
<b>UNIT V</b>	<b>APPLET PROGRAMMING</b>	<b>9+12</b>
Introduction – Applet Life Cycle – Creating an Executable Applet – Designing a Web Page – Applet Tag – Adding Applet to HTML File – Running the Applet – Passing Parameters to Applets – Getting Input from the User - Abstract Windowing Toolkit		
<b>Lab</b>		
9. Applet Programming		

10. Event Handling			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL HOURS</b>
<b>45</b>	<b>-</b>	<b>60</b>	<b>105</b>
<b>TEXT BOOKS:</b>			
Herbert Schildt, "Java 2 – The Complete Reference", Seventh Edition, Tata McGraw Hill, 2015.			
<b>REFERENCES:</b>			
Rajiv Chopra, "Java Programming", First Edition, New Age International, 2015. C.Muthu, "Programming With Java", 2nd Edition, Tata McGraw Hill Education Private Ltd., 2009.			
<b>E-REFERENCES:</b>			
<a href="https://www.cse.iitb.ac.in/~nlp-ai/javalect_august2004.html">https://www.cse.iitb.ac.in/~nlp-ai/javalect_august2004.html</a> <a href="http://www.tutorialspoint.com/java/">http://www.tutorialspoint.com/java/</a> <a href="http://www.w3schools.in/java/">http://www.w3schools.in/java/</a> <a href="http://beginnersbook.com/java-tutorial-for-beginners-with-examples/">http://beginnersbook.com/java-tutorial-for-beginners-with-examples/</a>			

### Mapping of COs with POs

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3				1				
<b>CO2</b>	2	3							
<b>CO3</b>	1	3	3	2	2				
<b>CO4</b>	1	3	3	2	2	3	2		
<b>CO5</b>		3	3	3	2	3	2	2	3
<b>Total</b>	7	12	9	7	7	6	4	2	3
<b>Scaled Value</b>	2	3	2	2	2	2	1	1	1

1-5 → 1, 6-10 → 2, 11-15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC304</b>			<b>ALLIED PHYSICS</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.5</b>	<b>0.5</b>	<b>0</b>					<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**PREREQUISITE:** Students with fundamental physics knowledge in HSC or SSLC level.

On the successful completion of the course, students will be able to

<b>Course Outcome</b>		<b>Domain</b>	<b>Level</b>
<b>CO1</b>	<i>State</i> the basics of laser and <i>distinguish</i> the various laser systems and <i>identify</i> various optical fiber and source and detector.	<b>Cognitive</b>	Knowledge, Analyze
<b>CO2</b>	<i>Recall the</i> semiconductor fundamentals and <i>Explain</i> characterization and applications.	<b>Cognitive</b>	Knowledge, Comprehension
<b>CO3</b>	<i>Know</i> the basics of operational amplifier and <i>Construct</i> various oscillators <i>Explain</i> various applications	<b>Cognitive, Psychomotor</b>	Knowledge, Analysis, Set
<b>CO4</b>	<i>Understand</i> the digital and gate principles <i>distinguish</i> Boolean algebra from algebra.	<b>Cognitive</b>	Knowledge
<b>CO5</b>	<i>Know</i> the basics of IC's <i>understand</i> the fabrication methods of IC's	<b>Cognitive</b>	Perception, Knowledge

**UNIT - I :** **Laser Physics** **12+3**

Principles of laser – population inversion – meta stable state – conditions for laser actions - Types – Nd-Yag – CO2 laser – Helium – neon laser – applications of lasers.

**UNIT - II :** **Fibre Optics Physics** **12+3**

Principle and propagation of light in optical fibres – Numerical Aperture and acceptance angle – Types of optical fibres – Source & detector – LED sensor – Block diagram fibre optics communication system – Applications.

**UNIT - III :** **Semiconductor Physics** **12+3**

Semiconductor fundamentals – Properties – Types of semiconductor – Volt – Ampere Characteristics of P-N junction Diode – Zener diode – applications of Zener diodes - Volt – Ampere Characteristics of common emitter NPN transistor, FET, UJT and SCR – Principles of LED and LCD.

**UNIT - IV :** **OPERATIONAL AMPLIFIER** **12+3**

Operational amplifier characteristics – inverting and non-inverting amplifier– adder, subtractor, integrator and differentiator circuits – Wien bridge oscillator – Phase shift oscillators and Twin-T oscillators

<b>UNIT - V :</b>	<b>Integrated Electronics</b>	<b>12+3</b>
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Basic monolithic ICs – Steps in fabrication of Monolithic IC’s – epitaxial growth – masking –etching impurity diffusion fabricating monolithic resistors, diodes, transistors and capacitors – circuit layout – contacts and inter connections– General applications of IC’s

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	15	0	60

**TEXT BOOKS:**

1.	V.K. Mehta, Principles of Electronics, S.Chand and CompanyLtd., 2009.
2.	Laser Physics – Thiagarajan, Springer
3.	Digital principles and Applications – Malvino& Leech, McGraw Hill Publication 7 <sup>th</sup> edition, 2011.

**REFERENCE BOOKS :**

1.	Basic Electronics – B.L. Theraja, S Chand & company Ltd, New Delhi.
2.	Fundamentals of digital computers – Bartee, McGraw-Hill.
3.	A. Mottershed, Semiconductor Devices and Applications, New Age Int Pub,

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc.	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3	2	1	1	0	1	0	1	1
<b>CO2</b>	0	1	3	2	0	2	0	2	2
<b>CO3</b>	1	2	3	0	0	2	0	2	2
<b>CO4</b>	1	2	3	1	0	2	0	1	2
<b>CO5</b>	0	3	0	1	0	2	0	1	2
<b>Average</b>	1	2	2	1	0	2	0	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

Mapping of CO with GA												
Course outcomes	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA10	GA11	GA12
CO1	1					3	2	1				1
CO2	1					3	2	1				1
CO3	1					3	2	1				1
CO4	1					3	2	1				1
CO5	1					3	2	1				1
<b>Total</b>	<b>5</b>					<b>15</b>	<b>10</b>	<b>5</b>				<b>5</b>
<b>Scaled</b>	<b>1</b>					<b>3</b>	<b>2</b>	<b>1</b>				<b>1</b>

			L	T	P	C
			0	0	1	1
<b>R PROGRAMMING</b>						
C	P	A	L	T	P	H
0.5	0.4	0.1	1	0	1	2
<b>PREREQUISITE:</b> Nil						
<b>COURSE OUTCOMES:</b>						
<b>COURSE OUTCOMES</b>					<b>DOMAIN</b>	<b>LEVEL</b>
After the completion of the course, students will be able to						
<b>CO1</b>	<b>Recognize</b> the significance of R				Cognitive	Remember
					Psychomotor	Perception
<b>CO2</b>	<b>Express</b> the knowledge on events and functions of R				Cognitive	Understand
<b>CO3</b>	<b>Employ</b> the understanding of the R and <b>Establish</b> application programme on their own and actively <b>participate</b> in the teams for designing various projects				Cognitive	Apply
					Psychomotor	Set

		Affective	Respond
Introduction - History - Features - Setting up path - Working with R - Basic Syntax - Variable and Data Types - Operator - Conditional Statements - Looping - Control Statements - Object - Functions –Strings- Vector-Lists-arrays-Packages–Dataframes– Database-Visualization			
Lab:			
Obtaining user data			
Using conditionals			
Using Random numbers			
Using Iteration			
Using Vector-Lists-arrays			
Using Functions			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>15</b>	<b>-</b>	<b>15</b>	<b>30</b>
<b>TEXT BOOKS:</b>			
Hands-On Programming with R, Garrett Golemund, O'Reilly Media, Inc, 2014			
<b>REFERENCES:</b>			
Mastering Predictive Analytics with R, Rui Miguel Forte, 2015 Packt Publishing			
<b>E-REFERENCES:</b>			
<a href="https://www.tutorialspoint.com/r/index.htm">https://www.tutorialspoint.com/r/index.htm</a> <a href="https://www.statmethods.net/r-tutorial/index.htm">https://www.statmethods.net/r-tutorial/index.htm</a> <a href="https://www.guru99.com/r-tutorial.html">https://www.guru99.com/r-tutorial.html</a> <a href="https://www.edureka.co/blog/r-tutorial/">https://www.edureka.co/blog/r-tutorial/</a>			

<b>XBC401</b>			<b>OPEN SOURCE SOFTWARE</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.8</b>	<b>0</b>	<b>0.2</b>					<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>PREREQUISITE:</b> Operating Systems, Programming in C										
<b>OBJECTIVE:</b>										
<ul style="list-style-type: none"> <li>• Realize the importance of learning Open Source Software</li> <li>• Understand the concepts in OSS</li> </ul>										



<ul style="list-style-type: none"> <li>Apply the knowledge in real time applications</li> </ul>			
COURSE OUTCOMES		DOMAIN	LEVEL
After the completion of the course, students will be able to			
<b>CO1</b>	<b>Recognize</b> the terminologies and licensing factors of Open Source Software	Cognitive	Remember
<b>CO2</b>	<b>Express</b> the significance of Open Source Software	Cognitive	Understand
<b>CO3</b>	<b>Employ</b> the understanding of Open Source Software and actively <i>participate</i> in teams for the development of open source software projects	Cognitive Affective	Apply Respond
<b>CO4</b>	<b>Utilize</b> the open source tools effectively in the real world applications.	Cognitive	Apply
<b>CO5</b>	<b>Design</b> the Open Source Web applications	Cognitive	Create
<b>UNIT I</b>	<b>INTRODUCTION TO OPEN SOURCE LICENSING</b>	<b>9+3</b>	
Basic Principles of Copyright Law – Contract and Copyright – Open Source Software Licensing – Issues with Copyrights and Patents – Open Source Definition – Warranties – MIT License – BSD License – Apache License – Academic Free License – GNU General Public License – GNU Lesser General Public License – Mozilla Public License – Application and Philosophy			
<b>UNIT II</b>	<b>NON-OPEN SOURCE LICENSES , LEGAL IMPACT AND SOFTWARE DEVELOPMENT</b>	<b>9+3</b>	
Classic Proprietary License – Sun Community License – Microsoft shared source initiative. Legal Impacts of Open Source and Free Software Licensing - Software Development using Open Source and Free Software Licenses.			
<b>UNIT III</b>	<b>GAWK – PROGRAMMING LANGUAGE</b>	<b>9+3</b>	
Conceptual Overview – Command Line Syntax – Patterns and Procedures – Built in Variables – operators – Variable and Array Assignments – User Defined Functions – gawk specific features – implementation limits			
<b>UNIT IV</b>	<b>SOURCE CODE MANAGEMENT</b>	<b>9+3</b>	
Introduction and Terminology – Usage Models – Source code management systems – Other Source Code Management Systems – Subversion Command Line client – Repository Administration – Examining the Repository – Providing Remote Access – Git Version Control System			
<b>UNIT V</b>	<b>VIRTUALIZATION</b>	<b>9+3</b>	

Conceptual Overview – Basic Virtualization Operations – Xen – KVM – Libvirt and Red Hat Virtual Machine Manager – Libvirt and Virtual Machine Manager Command - VMware ESX 3.5 – VMware Networking

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	15	-	60

**TEXT BOOKS:**

- Unit I** – Chapter 1,2 & 3 – “Understanding Open Source and Free Software Licensing” By Andrew M. St. Laurent - O’Reilly Media Publications
- Unit II** – Chapter 5,6 & 7 - “Understanding Open Source and Free Software Licensing” By Andrew M. St. Laurent - O’Reilly Media Publications
- Unit III** –Chapter 11 – “Linux in a Nutshell” By Ellen Siever, Stephen Figgins, Robert Love, and Arnold Robbins - O’Reilly Media Publications
- Unit IV** – Chapter 12,13 &14 – “Linux in a Nutshell” By Ellen Siever, Stephen Figgins, Robert Love, and Arnold Robbins - O’Reilly Media Publications
- Unit V** – Chapter 15 – “Linux in a Nutshell” By Ellen Siever, Stephen Figgins, Robert Love, and Arnold Robbins - O’Reilly Media Publications

**REFERENCES:**

- “Open Source Licensing” By Lawrence Rosen, Prentice Hall Publications
- “Linux System Programming” By Robert Love, O’Reilly Media Publications

**E-REFERENCES:**

- <http://git-scm.com/>
- <http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/>
- <http://www.gnu.org/philosophy/>
- <https://www.gnu.org/software/gawk/manual/>

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc.	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	1	1	0	1	0	1	1
CO2	0	1	3	2	0	2	0	2	2
CO3	1	2	3	0	0	2	0	2	2
CO4	1	2	3	1	0	2	0	1	2
CO5	0	3	0	1	0	2	0	1	2

<b>Average</b>	1	2	2	1	0	2	<b>0</b>	1	2
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3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC402</b>			<b>DATA STRUCTURES AND ALGORITHMS</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>1</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.5</b>	<b>0.5</b>	<b>0</b>					<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>
<b>PREREQUISITE:</b> Computer Programming										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Explains</i> the concept of data structures and analysis of algorithms					Cognitive		Understand		
						Psychomotor		Apply		
<b>CO2</b>	<i>Choose</i> the linear and non linear data structures					Cognitive		Remember		
<b>CO3</b>	<i>Apply</i> advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for particular problems					Cognitive		Apply		
						Psychomotor		Set		
<b>CO4</b>	<i>Analyse, evaluate</i> appropriate abstract data types and algorithm techniques to solve particular problems					Cognitive		Analyze		
<b>CO5</b>	<i>Build</i> an application using algorithm design techniques					Cognitive		Create		
<b>UNIT I</b>			<b>INTRODUCTION</b>				<b>12 + 9</b>			
Introduction to data structures - Abstract Data Type - Algorithms basic concepts - Efficiency of an algorithm - Asymptotic Notation and Analysis of algorithms										
<b>Lab</b>										
Analysing sorting algorithms										
Analysing searching algorithms										

<b>UNIT II</b>	<b>LINEAR DATA STRUCTURES</b>	<b>12 + 9</b>	
List – Application of List – Stacks, Implementation and Application – Queue, Implementation and Application			
<b>Lab</b>			
Application of list, stack and queue			
<b>UNIT III</b>	<b>TREES</b>	<b>12 + 9</b>	
Basic Tree concept - Binary trees – Tree traversals – Binary search tree, Implementation – AVL tree – Application			
<b>Lab</b>			
Tree Traversal			
Binary search tree application			
<b>UNIT IV</b>	<b>GRAPHS</b>	<b>12 + 9</b>	
Basic terminology – Graph traversal – Application – Networks Shortest path algorithms			
<b>Lab</b>			
Graph Traversal			
Applications using shortest path algorithms			
<b>UNIT V</b>	<b>ALGORITHM DESIGN TECHNIQUES</b>	<b>12 + 9</b>	
Divide and Conquer algorithms, Dynamic Programming, Greedy algorithms, Backtracking and Branch & bound.			
<b>Lab</b>			
Applications using algorithm design techniques			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>15</b>	<b>45</b>	<b>105</b>

<b>COURSE CODE</b>	<b>XBC403</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>COMPUTER NETWORKS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>PREREQUISITES</b>	<b>XBC202</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>	<b>2.8 : 0.2 :0</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

**REFERENCES:**

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2007.
2. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, "Computer Algorithms", Galgotia Publications Pvt. Ltd., 2002
3. A.V. Aho, J.E. Hopcroft and J.D. Ullman "Data Structures and Algorithms" Pearson Education Delhi, 2002
4. [www.tutorialspoint.com](http://www.tutorialspoint.com)
5. [www.nptel.com](http://www.nptel.com)
6. [www.virtuallab.ac.in](http://www.virtuallab.ac.in)Lecture Slides, Multiple Choice Questions, Animations Link: [http://highered.mheducation.com/sites/0072967757/student\\_view0/index.html](http://highered.mheducation.com/sites/0072967757/student_view0/index.html)
7. Lecture Slides : <http://www.mhhe.com/engcs/compsci/forouzan/>

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>
<b>CO2</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>
<b>CO3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>
<b>CO4</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>2</b>
<b>CO5</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>
<b>Average</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	<i>Recognize</i> the importance of computer networks and <i>explain</i> the network models, media, layering.	Cognitive	Remember
		Psychomotor	Guided
CO2	<i>Describe</i> the functionalities of layer and <i>indicate</i> the various network connecting devices.	Cognitive	Understand
CO3	<i>Demonstrate</i> the unicast and multicast routing.	Cognitive	Understand
		Psychomotor	Response
CO4	<i>Match</i> and <i>Show</i> the protocol for real time applications.	Cognitive	Remember
		Psychomotor	Set
CO5	<i>Analyze</i> the protocols of application layer and <i>Design</i> a simple networks.	Cognitive	Analyze
		Psychomotor	Origination
<b>UNIT I</b>	<b>NETWORK FUNDAMENTALS AND PHYSICAL LAYER</b>		<b>9+3</b>
Introduction – Data Communications – Networks – Network Types – Internet History – Standards and Administration - Network Models – Protocol Layering – TCP/IP Protocol Suite – The OSI Model – Transmission Media – Switching			
<b>UNIT II</b>	<b>DATA LINK LAYER</b>		<b>9+3</b>
Introduction to Data Link Layer – Link Layer Addressing - Error Detection and Error Correction - Data Link Control - MAC – Wired LANs: Ethernet - Wireless LANs – Other Wireless Networks - Connecting Devices and Virtual LANs			
<b>UNIT III</b>	<b>NETWORK LAYER</b>		<b>9+3</b>
Introduction to Network Layer – Network Layer Protocols – Unicast Routing – Multicast Routing			
<b>UNIT IV</b>	<b>TRANSPORT LAYER</b>		<b>9+3</b>

Introduction to Transport Layer – Transport Layer Protocols – User Datagram Protocol – Transmission Control Protocol – SCTP			
<b>UNIT V</b>	<b>APPLICATION LAYER AND SECURITY</b>		<b>9+3</b>
Introduction to Application Layer – Standard Client Server Protocols – Multimedia – WWW and HTTP – FTP – Electronic Mail – TELNET - DNS			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL HOURS</b>
<b>45</b>	<b>15</b>	<b>-</b>	<b>60</b>
<b>TEXT BOOKS</b>			
Behrouz A. Forouzan, “Data Communications and Networking”, Fifth Edition, McGraw Hill Education, 2013.			
<b>REFERENCES</b>			
Achyut S Godbole, Atul Hahate, “Data Communications and Networks”, Second Edition, New Delhi : Tata McGraw-Hill Education, 2011.			
2. Andrew S. Tanenbaum, David J. Wetherall “Computer Networks”, Fifth Edition, Pearson Education Inc., 2013.			
William Stallings, “Data and Computer Communications”, Tenth Edition, Pearson Education, 2014.			
<b>E-REFERENCES</b>			
Video Lecture Link: <a href="http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_videoNotes.html">http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_videoNotes.html</a> Lecture Slides, Multiple Choice Questions, Animations Link: <a href="http://highered.mheducation.com/sites/0072967757/student_view0/index.html">http://highered.mheducation.com/sites/0072967757/student_view0/index.html</a> Lecture Slides : <a href="http://www.mhhe.com/engcs/compsci/forouzan/">http://www.mhhe.com/engcs/compsci/forouzan/</a>			

### Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	2	1	0	1	0	1	0	0	0
<b>CO2</b>	1	2	2	1	0	1	0	1	0
<b>CO3</b>	1	1	3	3	2	2	1	0	0
<b>CO4</b>	1	1	3	3	2	2	1	2	0
<b>CO5</b>	0	1	3	2	1	1	1	0	0

Average	1	1	2	2	1	1	1	1	0
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3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC404</b>			<b>.NET TECHNOLOGIES</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>1</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.8</b>	<b>1</b>	<b>0.2</b>					<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>
<b>PREREQUISITE:XBC303</b>										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Recognize</i> the basics of .net frame work					Cognitive		Remember		
						Psychomotor		Perception		
<b>CO2</b>	<i>Express</i> and <i>relate</i> decision and iteration control structures to implement programs					Cognitive		Understand		
						Psychomotor		Perception		
<b>CO3</b>	<i>Predict</i> and <i>Create</i> database connection and <i>manipulate</i> the data source					Cognitive		Understand		
						Psychomotor		Create		
								Guided Response		
<b>CO4</b>	<i>Choose</i> and <i>Apply</i> controls and <i>reproduce</i> well-structured .NET applications					Cognitive		Remember		
						Psychomotor		Apply		
								Guided Response		
<b>CO5</b>	<i>Construct</i> and <i>demonstrate</i> various real-world applications in ASP.NET with C#					Cognitive		Create		
						Psychomotor		Mechanism		
						Affective		Valuing		



<b>UNIT I</b>	<b>INTRODUCTION TO .NET FRAMEWORK</b>		<b>7+6</b>
<p>Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation - Automatic Memory Management.- Visual Studio .NET - Using the .NET Framework.- The Framework Class Library- .NET objects - ASP .NET - .NET web services – Windows Forms</p> <p><b>Lab:</b> 1.Familiarizing with .NET Environment</p>			
<b>UNIT II</b>	<b>INTRODUCTION TO C#.NET</b>		<b>11+6</b>
<p>Variables and constants – data types – declaration. Operators – types – precedence. Expressions. Program flow – Decision statements – Loop statements – Value data types – Structures, Enumerations. Reference data types- Single dimensional – Multi-dimensional arrays – jagged arrays – dynamic arrays Windows programming– creating windows Forms – windows controls –Events. Menus and Dialog Boxes– Creating menus – menu items – context menu – Using dialog boxes – showDialog() method.</p> <p><b>Lab:</b> 1. Work with Console</p> <p>2. Looping and Conditional Statements</p> <p>3. Working with various Controls such as timer, calendar, etc.,</p> <p>4. Create basic text editor</p>			
<b>UNIT III</b>	<b>APPLICATION DEVELOPMENT USING ADO .NET</b>		<b>9+6</b>
<p>Architecture of ADO.NET – ADO.NET providers – Connection – Command – Data Adapter – Dataset. Accessing Data with ADO.NET - Connecting to Data Source, Accessing Data with Data set and Data Reader - Create an ADO.NET application - Using Stored Procedures.</p> <p><b>Lab:</b> 1. Insert, Delete, Update and Modify Operations</p> <p>2. Store and retrieve data using Data Grids</p>			
<b>UNIT IV</b>	<b>INTRODUCTION TO ASP.NET</b>		<b>9+6</b>
<p>ASP.NET Features: Change the Home Directory in IIS - Add a Virtual Directory in IIS Set a Default Document for IIS - Change Log File Properties for IIS - Stop, Start, or Pause a Web Site. Web Controls - HTML Controls, Using Intrinsic Controls, Using Input Validation Controls, Selecting Controls for Applications - Adding web controls to a Page.Server Controls - Types of Server Controls - Adding ASP.NET Code to a Page.</p> <p><b>Lab:</b> 1. Working with various Controls</p> <p>2. Using stored Procedures</p> <p>3. Form Creation with HTML</p>			

<b>UNIT V</b>	<b>APPLICATIONS OF ASP.NET WITH C#</b>			<b>9+6</b>
Windows Application: Creation of Media Player. Web Applications: Job Portal, E-mail and SMS Server, Online food ordering System.				
<b>Lab:</b>				
Real Time Projects				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>	
<b>45</b>	<b>-</b>	<b>30</b>	<b>75</b>	
<b>TEXT BOOKS:</b>				
David Chappell, "Understanding .NET", 2nd Edition, Addison-Wesley Professional, 2006. Andrew Troelsen, PhilJapikse , "Pro C# 7 With .NET and .NET Core", Apress, 2017. Matthew Macdonald, "ASP.NET: The Complete Reference", McGraw Hill Education, 2017.				
<b>REFERENCES:</b>				
<a href="#">Herbert Schildt</a> , "C# 4.0 The Complete Reference", McGraw-Hill Education, 2010. <a href="#">Marino Posadas</a> , "Mastering C# and .NET Framework", Packt Publishing, 2016. Paul Deitel and Harvey Deitel, "Visual C# How to Program", Prentice Hall; Pearson Education Limited; 6th edition (2017).				
<b>E-REFERENCES</b>				
<a href="http://www.tutorialspoint.com">www.tutorialspoint.com</a> <a href="http://www.microsoft.com/net">www.microsoft.com/net</a> <a href="http://www.w3schools.com/aspnet">www.w3schools.com/aspnet</a>				

### COs versus POs mapping

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3				1		1		
<b>CO2</b>	2	2	1	2	3	0	2	1	
<b>CO3</b>	2	3	2	2	3	1	2	2	
<b>CO4</b>	2	3	2	2	3	0	2	2	3
<b>CO5</b>	1	3	3	2	3	1	2	3	2
<b>Total</b>	10	11	8	10	13	2	9	8	5
<b>Scaled Value</b>	2	3	2	2	3	1	2	2	1

1-5 → 1, 6-10 → 2, 11-15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC405A</b>			<b>PRINCIPLES OF MANAGEMENT</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.75</b>	<b>0.25</b>	<b>.25</b>					<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b> Basic principles in an organization.										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Recognize</i> the significance of Management Principle.					Cognitive Psychomotor	Remember Perception			
<b>CO2</b>	<i>Express</i> the understanding of the concept of planning the events in organization.					Cognitive	Understand			
<b>CO3</b>	<i>Employ</i> the understanding of the various scheduling activities and actively <i>participate</i> in terms for the organizing of various events in organization.					Cognitive Affective	Apply Respond			
<b>CO4</b>	<i>Utilize</i> the directing effectively in the real world class room management.					Cognitive	Apply			
<b>CO5</b>	<i>Design</i> and <i>Establish</i> the principles of management concept in day to day activities.					Cognitive Psychomotor	Create Set			
<b>UNIT I</b>			<b>OVERVIEW OF MANAGEMENT</b>						<b>9</b>	
Definition - Management - Role of managers - Evolution of Management thought-Organization										

and the environmental factors – Trends and Challenges of Management in Global Scenario.

<b>UNIT II</b>	<b>PLANNING</b>	<b>9</b>
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Nature and purpose of planning - Planning process - Types of plans –Objectives - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision Decision Making Process - Rational Decision Making Process - Decision Making under different conditions

<b>UNIT III</b>	<b>ORGANIZING</b>	<b>9</b>
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Nature and purpose of organizing - Organization structure - Formal and informal groups organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - -Performance Appraisal.

<b>UNIT IV</b>	<b>DIRECTING</b>	<b>9</b>
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Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.

<b>UNIT V</b>	<b>CONTROLLING</b>	<b>9</b>
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Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations.

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>--</b>	<b>--</b>	<b>45</b>

<b>REFERENCES:</b>		
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1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition.
2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.
3. Hellriegel, Slocum & Jackson, 'Management - A Competency Based Approach', Thomson South Western, 10th edition, 2007.
4. <https://www.pearsonhighered.com>
5. [www.miracleworx.com](http://www.miracleworx.com)

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	0	0	1	1	0	0	0	2	2
CO2	0	1	0	1	0	1	1	2	2
CO3	0	2	2	1	1	2	2	2	1
CO4	0	1	1	1	0	1	1	2	2
CO5	0	1	1	1	0	1	1	3	3
Average	0	1	1	1	1	1	1	2	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>XBC405B</b>			<b>TOTAL QUALITY MANAGEMENT</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>					<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b>										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>List and Explain</i> the basic concepts of total quality concepts and its limitations.					Cognitive		Remembering Understanding		
<b>CO2</b>	<i>Analyze and Explain</i> the Customer satisfaction, Employee involvement, supplier selection and appraise the performance by TQM principle.					Cognitive		Analyse Evaluate		
<b>CO3</b>	<i>Explain and Apply</i> the Statistical Process Control Tools.					Cognitive		Understand Apply		
<b>CO4</b>	<i>Select and Explain</i> the different TQM tools and their significance					Cognitive		Remembering Understanding		

<b>CO5</b>	<i>Explain</i> the importance aspects of different quality systems.	Cognitive	Understanding
<b>UNIT I</b>	<b>INTRODUCTION</b>		<b>9</b>
Definition of quality – Dimensions of quality – Quality planning – Quality costs – Analysis techniques for quality costs – Basic concepts of Total Quality Management – Historical review –Principles of TQM – Leadership – Concepts – Role of senior management – Quality Council –Quality statements – Strategic planning – Deming philosophy – Barriers to TQM implementation			
<b>UNIT II</b>	<b>TQM PRINCIPLES</b>		<b>9</b>
Customer satisfaction – Customer perception of quality – Customer complaints – Service quality – Customer retention – Employee involvement – Motivation, empowerment, teams, recognition and reward – Performance appraisal – Benefits – Continuous process improvement – Juran trilogy – PDSA cycle – 5S – Kaizen – Supplier partnership – Partnering – Sourcing – Supplier selection – Supplier rating – Relationship development – Performance measures – Basic concepts – Strategy – Performance measure.			
<b>UNIT III</b>	<b>STATISTICAL PROCESS CONTROL (SPC)</b>		<b>9</b>
The seven tools of quality – Statistical fundamentals – Measures of central tendency and dispersion – Population and sample – Normal curve – Control charts for variables and attributes – Process capability – Concept of six sigma – New seven management tools.			
<b>UNIT IV</b>	<b>TQM TOOLS</b>		<b>9</b>
Benchmarking – Reasons to benchmark – Benchmarking process – Quality Function Deployment (QFD) – House of quality – QFD process – Benefits – Taguchi quality loss function – Total Productive Maintenance (TPM) – Concept – Improvement needs – FMEA – Stages of FMEA.			
<b>UNIT V</b>	<b>QUALITY SYSTEMS</b>		<b>9</b>
Need for ISO 9000 and other quality systems – ISO 9000:2000 quality system – Elements – Implementation of quality system – Documentation – Quality auditing – TS 16949 – ISO 14000 – Concept, requirements and benefits.			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>-</b>	<b>-</b>	<b>45</b>
<b>REFERENCES:</b>			
<ol style="list-style-type: none"> <li>1. Dale H. Besterfield, et. Al. “Total Quality Management”, New Delhi, Pearson Education, Inc.. 2007.</li> <li>2. James R. Evans and William M. Lidsay, “The Management and Control of Quality”, 5<sup>th</sup> Edition, South-Western, 2002.</li> <li>3. Feigenbaum, A.V., “Total Quality Management”, McGraw Hill, 1991.</li> <li>4. Oakland, J.S., “Total Quality Management”, Butterworth Heineman, 1989.</li> <li>5. Narayana V. and Sreenivasan, N.S., “Quality Management – Concepts and Tasks”, New Age International, 1996.</li> <li>6. <a href="http://nptel.ac.in/faq/110101010/Prof.IndrajitMukherjee.IIT.Bombay">http://nptel.ac.in/faq/110101010/Prof.IndrajitMukherjee.IIT.Bombay</a> and Prof.TapanP.Bagchi, IIT, Kharagpur.</li> </ol>			

**Table 1: COs Vs CPA (Learning Domain) mapping**

Domain/Components	CO1	CO2	CO3	CO4	CO5	Total	Scaled total
Cognitive = 3							
Remembering	0.25			0.25			0.5
Understanding	0.25		0.5	0.5	0.5		1.75
Analyzing		0.25					0.25
Applying			0.25				0.25
Evaluating		0.25					0.25

**Table 2: COs Vs GA mapping**

	CO1	CO2	CO3	CO4	CO5	Total	Scaled total
GA1	2	1	2	1	1	7	2
GA4	1	1	2	2	1	7	2
GA5	1	1	2	2	1	7	2
GA6	1	1	2	1	2	7	2
GA7	1	1	1	1	1	5	1
GA8	1	1	1	2	2	7	2
GA9	1	1	1	-	1	4	1
GA10	1	1	1	2	2	7	2
GA12	1	1	-	-	2	4	1

Scale :

0 - 0

1-5 - 1  
 6- 10 - 2  
 11 – 15 - 3

<b>XBC405C</b>			<b>E-COMMERCE</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.75</b>	<b>0</b>	<b>.25</b>					<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b> Computer Network										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Recognize and Discuss</i> the scope of e-commerce					Cognitive		Remember Understand		
<b>CO2</b>	<i>Sketch and Develop</i> various Business strategies					Cognitive		Apply Analyze		
<b>CO3</b>	<i>Survey and Identify</i> the importance and future of e market and EDI					Cognitive		Analyze		
<b>CO4</b>	<i>Justify and Explain</i> the usage of Internet in e-commerce and various types of e-commerce					Cognitive		Evaluate Valuing		
<b>CO5</b>	<i>Practice and Perform</i> Various on line transactions					Affective		Responding to a phenomena		
<b>UNIT I</b>			<b>Introduction to E-Commerce</b>						<b>9</b>	
Introduction - the scope of e-commerce – definition - electronic markets -electronic data interchange – internet commerce – the value chain – supply chain										
<b>UNIT II</b>			<b>Business Strategy in an Electronic Age</b>						<b>9</b>	



Business Strategy – introduction to business strategy – strategic implications of IT – Technology – Business environment – business capability – existing business strategy – strategy formulation and implementation planning			
<b>UNIT III</b>	<b>Business to Business Electronic Commerce</b>		<b>9</b>
Electronic markets – Markets – usage of electronic markets – advantages and disadvantages – future of electronic markets – electronic data interchange – introduction – EDI definition – the benefits of EDI – EDI technology – EDI standards – EDI communications			
<b>UNIT IV</b>	<b>Business to Consumer Electronic Commerce</b>		<b>9</b>
Consumer trade transaction – the e-shop – advantages and disadvantages of consumer e-commerce – the internet – the development of internet – TCP/IP – internet components – uses of internet			
<b>UNIT V</b>	<b>Elements of e-commerce and e-business</b>		<b>9</b>
Elements – e-Visibility – the e-shop – online payments – delivering the goods – after sales service – internet e-commerce security – e-business – internet bookshops – grocery supplies – software supplies and support – electronic news paper – internet banking			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>
<b>REFERENCES:</b>			
1. David Whiteley “E-commerce: Strategy, Technologies and Applications” Tata McGraw-Hill Publications, 2011.			
2. EfraimTurvanJ.Lee, David kug and chung, “Electronic commerce” Pearson Education Asia 2001.			
3. Manlyn Greenstein and Miklos “Electronic commerce” McGraw-Hill, 2002			

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	0	0	1	1	0	0	0	2	2
<b>CO2</b>	0	1	0	1	0	1	1	2	2
<b>CO3</b>	0	2	2	1	1	2	2	2	1
<b>CO4</b>	0	1	1	1	0	1	1	2	2
<b>CO5</b>	0	1	1	1	0	1	1	3	3

<b>Average</b>	0	1	1	1	1	1	1	2	2
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3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

			<b>PYTHON PROGRAMMING</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>0.5</b>	<b>0.4</b>	<b>0.1</b>					<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>
<b>PREREQUISITE:</b> Nil										
<b>COURSE OUTCOMES:</b>										
<b>COURSE OUTCOMES</b>						<b>DOMAIN</b>		<b>LEVEL</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Recognize</i> the significance of Python					Cognitive		Remember		
						Psychomotor		Perception		
<b>CO2</b>	<i>Express</i> the knowledge on events and functions of Python					Cognitive		Understand		
<b>CO3</b>	<i>Employ</i> the understanding of the Python and <i>Establish</i> application programme on their own and actively <i>participate</i> in the teams for designing various projects					Cognitive		Apply		
						Psychomotor		Set		
						Affective		Respond		
Introduction - History - Features - Setting up path - Working with Python - Basic Syntax - Variable and Data Types - Operator - Conditional Statements - Looping - Control Statements - String Manipulation - Lists - Tuple - Functions - Modules - Input-Output - Exception Handling - Database										
Lab:										
Obtaining user data										
Using conditionals										
Using Random numbers										
Using Iteration										
Using Tuples										
Using Functions										

LECTURE	TUTORIAL	PRACTICAL	TOTAL
15	-	15	30

**TEXT BOOKS:**

Problem Solving and Python Programming Paperback – 2017 by Kulkarni, YesDee Publication

**REFERENCES:**

David Beazley and Brian K.Jones, "Python Cookbook", Third Edition, O'Reilly Media, Inc.,CA, 2013.  
Mark Lutz, "Learning Python", Fifth Edition, O'Reilly Media, Inc.,CA, 2013.

**E-REFERENCES:**

<https://docs.python.org/3/tutorial/>  
<https://www.tutorialspoint.com/python/>  
<https://www.learnpython.org/>  
<https://www.javatpoint.com/python-tutorial>  
<http://thepythonguru.com/>

XBC501	SOFTWARE ENGINEERING	L	T	P	C
		3	0	0	3
Prerequisite	Computer Fundamentals	L	T	P	H
C:P:A	2.9:0:0.1	3	0	0	3
Course Outcome		Domain		Level	
CO 1	<i>Recognize</i> the significance of entire Software Engineering process.	Cognitive		Remember	
CO 2	<i>Express</i> the functionalities of Cost Estimation and Requirement Specification Techniques.	Cognitive		Understand	
CO 3	<i>Describe</i> the concepts and guidelines of Software Design, Coding, Testing and Maintenance.	Cognitive		Understand	
CO 4	Actively <i>Participate</i> in <i>Choosing</i> the appropriate techniques and methods for the real time applications as a team.	Affective		Response	
		Cognitive		Apply	
CO 5	<i>Analyze</i> the techniques used in the various stages of Software Engineering.	Cognitive		Analyze	
UNIT I	INTRODUCTION AND PLANNING A SOFTWARE PROJECT			9	

Introduction - Definitions – Size Factors – Quality and Productivity factors – Managerial Issues.			
Planning a Software Project – Defining the Problem – Developing a Solution Strategy – Planning the Development Process – Planning an Organizational Structure – Other Planning Activities.			
<b>UNIT II</b>	<b>COST ESTIMATION AND REQUIREMENTS SPECIFICATION</b>		<b>9</b>
Software Cost Estimation – Cost Factors – Cost Estimation Techniques – Staffing – Level Estimation – Estimating Software Maintenance Costs.			
Software Requirements Definition – Software Requirement Specification – Formal Specification Techniques – Language and Processors for Requirements.			
<b>UNIT III</b>	<b>SOFTWARE DESIGN</b>		<b>9</b>
Software Design – Fundamental Design Concepts – Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real Time and Distributed System design – Test Plans – Milestones, Walkthroughs and Inspections – Design Guidelines.			
<b>UNIT IV</b>	<b>IMPLEMENTATION</b>		<b>9</b>
Implementation Issues – Structured Coding Techniques – Coding Style – Standard and Guidelines – Documentation guidelines – Data Abstraction – Exception Handling – Concurrency Mechanisms.			
<b>UNIT V</b>	<b>TESTING AND MAINTENANCE</b>		<b>9</b>
Verification and Validation Techniques – Quality Assurance – Walkthroughs and Inspections – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification.			
Software Maintenance – Enhancing Maintainability during Development – Managerial aspects – Configuration Management – Source Code Metrics – Other Maintenance Tools and Techniques.			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>-</b>	<b>-</b>	<b>45</b>
<b>TEXT BOOKS:</b>			

Richard E.Fairley, Software Engineering Concepts, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008.

**REFERENCES:**

1. Roger.S.Pressman, Software Engineering A Practitioner’s Approach, Sixth Edition, Tata McGraw Hill Higher Education, 2010.
2. Ian Sommerville, Software Engineering, Ninth Edition, Pearson Education Inc., 2012.

**WEBSITES:**

1. <http://www.rspa.com/spi/>
2. <https://www.wiziq.com/tutorials/software-engineering>
3. <http://www.tutorialride.com/software-engineering/software-engineering-tutorial.htm>
4. [https://www.tutorialspoint.com/software\\_engineering/software\\_engineering\\_tutorial.pdf](https://www.tutorialspoint.com/software_engineering/software_engineering_tutorial.pdf)

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	2	1	1	1	1	2
CO2	3	1	3	2	1	1	1	1	2
CO3	2	2	2	2	1	2	1	1	1
CO4	3	2	2	2	1	1	1	2	2
CO5	2	2	2	2	2	1	1	2	1
Average	2	2	2	2	1	1	1	1	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>XBC502</b>			<b>DATA BASE MANAGEMENT SYSTEM</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.5</b>	<b>0.5</b>	<b>0</b>					<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>
<b>PREREQUISITE:</b> Computer Fundamentals										

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	<i>Recognize</i> and <i>Express</i> the fundamentals of Data Base Management System and Relational database system	Cognitive	Remember Understand
CO2	<i>Recognize</i> and <i>Explain</i> the Transaction Management and Storage implementation techniques	Cognitive	Remember Understand
CO3	<i>Sketch and show</i> the Relational data base design for the real time application.	Cognitive Psychomotor	Apply Set
CO4	<i>Analyze and Apply</i> proper Relational data base queries	Cognitive	Analyze Apply
CO5	<i>Design and Construct</i> an application with suitable form design and data base	Psychomotor	Origination
<b>UNIT I</b>	<b>INTRODUCTION</b>		<b>12</b>
Data base system Applications -Purpose of Database System – Views of data – Data base languages- Relational Databases – Data base Design - Data Storage and querying – Database System Architecture – Data mining and Information retrieval - Data base users and administrators - History of Data base system			
<b>Lab : Working with DDL, DML ,DCL</b>			
<b>UNIT II</b>	<b>RELATIONAL DATABASES</b>		<b>12</b>
Structure of Relational Databases – Database schema –keys – schema diagram – Relational operations – Relational Algebra – Introduction to SQL – Overview of the SQL Query Languages – SQL data definition - Basic structure of SQL queries – Additional Basic operations – Set Operations –Null Values –Nested sub queries			
<b>Lab : Working with Database Queries, Trigger , View</b>			
<b>UNIT III</b>	<b>DATABASE DESIGN</b>		<b>12</b>

Data base design and the ER model - Overview of the design process - Entity– Relationship model – Constraints - Entity Relationship diagrams – Entity Relationship design issues – Extended ER features - Relational database design – Features of good relational designs –Atomic domains and First Normal form - Decomposition using functional dependencies

**Lab : Working with PL/SQL Basics , Procedures and Functions**

<b>UNIT IV</b>	<b>TRANSACTION MANAGEMENT</b>	<b>12</b>
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Transaction Concepts – A simple Transaction model – Storage structure – Transaction atomicity and durability – Transaction Isolation - Serializability - Concurrency control – Lock based protocol – timestamp based protocol - Transaction Recovery – Failure classification – storage – Recovery and Atomicity

**Lab : Working with Transaction control**

<b>UNIT V</b>	<b>IMPLEMENTATION TECHNIQUES</b>	<b>12</b>
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Storage and file structure - Overview of physical storage media – Magnetic disk and flash storage – RAID – File organization – Organization of records in files - Data dictionary storage - Indexing and hashing – Basic concepts – ordered indices – B+ Tree index files - Distributed data base - Distributed data storage - Distributed transactions

**Lab : Working with Form Design**

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>15</b>	<b>30</b>	<b>90</b>

**REFERENCES:**

Abraham Silberschatz, Henry F. Korth, S. Sudharshan, 2011.“Database System Concepts”, Sixth Edition, Tata McGraw Hill.  
RamezElmasri, Shamkant B. Navathe., 2008. “Fundamentals of Database Systems”, Fifth Edition , Pearson.  
Raghu Ramakrishnan., 2010. “Database Management Systems”, Fourth Edition, Tata McGraw Hill.  
G.K.Gupta, 2011.”Database Management Systems”, Tata McGraw Hill.

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	0	1	2	0	1	0	0	3	3
<b>CO2</b>	0	1	1	1	0	0	0	1	1
<b>CO3</b>	1	3	1	1	1	0	0	3	3
<b>CO4</b>	1	3	2	1	1	1	1	3	3
<b>CO5</b>	3	3	2	2	1	1	1	3	2
<b>Average</b>	1	2	2	1	1	0	0	3	2

High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XBC503			DATA WAREHOUSING AND DATA MINING				L	T	P	C
							3	1	1	5
C	P	A					L	T	P	H
2.5	0.25	0.25					3	1	2	5
<b>PREREQUISITE:</b> XBC402										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Analyze</i> Multidimensional Intelligent model from typical system					Cognitive		Analyze		
<b>CO2</b>	<i>Evaluate</i> various mining techniques on complex data objects					Cognitive		Evaluate		
<b>CO3</b>	<i>Understand</i> Data Mining processes using Open Source Data Mining tool.					Cognitive		Understand		
<b>CO4</b>	<i>Choose</i> the appropriate techniques and algorithms for extracting data					Cognitive Affective		Apply Respond		
<b>CO5</b>	<i>Recognize</i> the knowledge of data mining, data preprocessing and data warehousing					Cognitive Psychomotor		Analyze Perception		



<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9+6</b>	
<p><b>Introduction</b>, Fundamentals of data mining, Data Mining Functionalities, <b>Data Preprocessing</b> : Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction</p> <p>Lab: Perform Data Preprocessing using tool Perform Visualization of data using tool</p>			
<b>UNIT II</b>	<b>DATA WAREHOUSING</b>	<b>9+6</b>	
<p>Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.</p> <p>Lab: Implement the following Multidimensional Data Models i.StarSchema ii.Snowflake Schema iii.Fact Constellation</p>			
<b>UNIT III</b>	<b>ASSOCIATION</b>	<b>9+6</b>	
<p><b>Mining Association Rules in Large Databases</b>, Association Rule Mining, Apriori Algorithm and Frequent pattern growth algorithm</p> <p>Lab: Classification, Association and Clustering algorithms using tool Implement Apriori algorithm to generate frequent Item Sets</p>			
<b>UNIT IV</b>	<b>CLASSIFICATION</b>	<b>9+6</b>	
<p><b>Classification and Prediction</b>, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining</p> <p>Lab: Implement the following classification algorithms i.Decision Tree Induction ii.KNN</p>			
<b>UNIT V</b>	<b>CLUSTERING</b>	<b>9+6</b>	
<p><b>Cluster Analysis Introduction</b> Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.</p> <p>Lab: Implement the following clustering algorithms i.K-means ii.K-medoids</p>			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>

<b>45</b>		<b>30</b>	<b>75</b>
<b>TEXTBOOKS:</b>			
Data Mining – Concepts And Techniques - Jiawei Han & Micheline Kamber Harcourt India.			
<b>REFERENCES:</b>			
Data Mining Introductory And Advanced Topics –Margaret H Dunham, Pearson Education Data Mining Techniques – Arun K Pujari, University Press. Data Warehousing In The Real World – Sam Anahory & Dennis Murray. Pearson Edn Asia. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley Student Edition. The Data Warehouse Life Cycle Tool Kit – Ralph Kimball Wiley Student Edition.			
<b>E-REFERENCES:</b>			
<a href="http://www.tutorialspoint.com/data_mining">http://www.tutorialspoint.com/data_mining</a> <a href="http://www.dataminingconsultant.com/resources.html">http://www.dataminingconsultant.com/resources.html</a>			

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3	2	3	2	2	1	1	1	3
<b>CO2</b>	2	3	2	3	1	1	1	2	3
<b>CO3</b>	3	2	3	2	2	2	1	2	3
<b>CO4</b>	3	2	2	3	1	1	1	1	3
<b>CO5</b>	2	3	2	2	2	2	1	2	3

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

SUB CODE			SUB NAME	L	T	P	C
<b>XBC504</b>			<b>FUNDAMENTALS OF STATISTICS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>					
<b>3.0</b>	<b>0.5</b>	<b>0.5</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
				<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>PREREQUISITE: SOME BASIC KNOWLEDGE OF STATISTICS IS REQUIRED</b>							
<b>COURSE OUTCOMES:</b>							

<b>Course outcomes:</b>	<b>Domain</b>	<b>Level</b>
<b>CO1:</b> Explain the statistical data in the form of table, diagram and graph.	Cognitive	Applying
<b>CO2:</b> Find the measures of central tendency and measures of dispersion and skewness for the given data.	Cognitive	Understanding Applying
<b>CO3:</b> Evaluate correlation coefficient using Karl Pearson's and find the regression line for the given data.	Cognitive	Understanding Applying
<b>CO4:</b> Solve the problem in the time series using the method of seasonal variation and find the interpolation using Newtons and Lagranges method.	Cognitive Psychomotor	Applying Imitation
<b>CO5:</b> Find the index number using aggregative, relative and cost of living index number method. Define the sampling technique and Apply the concept of test of significance for t, f and chi-square.	Cognitive Affective	Remembering Applying Receiving

<b>UNIT I</b>	<b>15</b>	
Introduction - Classification and tabulation of statistical data - Diagrammatic and graphical representation of data.		
<b>UNIT II</b>	<b>15</b>	
Measures of Central tendency - Mean, Median and Mode - Dispersion, Range, Quartile deviation, Mean Deviation, Standard Deviation - Measures of Skewness.		
<b>UNIT III</b>	<b>15</b>	
Correlation - Karl Pearson's co-efficient of correlation - Spearman's Rank Correlation regression lines and Co-efficient.		
<b>UNIT IV</b>	<b>15</b>	
Time series Analysis - Trend - Seasonal variations - Interpolation - Newtons and Lagranges method of estimation.		
<b>UNIT V</b>	<b>15</b>	
Index numbers - aggregative and relative index - chain and fixed indeed wholesale index - Cost of living index - Sampling Techniques - types of sample and sampling procedure - tests of significance - Normal, t, F, chi -square - Simple Problems.		
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
<b>45</b>	<b>15</b>	<b>60</b>
<b>TEXT</b>		

1. Statistical methods - S.P. Gupta - S. Chand & Co., New Delhi.

**REFERENCES**

1. The Fundamentals of Statistics - Elhance. Elhance publication.

2. Business Mathematics and Statistics - Dr. P. R. Vittal - Margham Publications, Chennai.

**E REFERENCES**

[www.nptel.ac.in](http://www.nptel.ac.in)

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**TABLE 1: COs VS GAs Mapping**

	<b>GA1</b>	<b>GA2</b>	<b>GA3</b>	<b>GA4</b>	<b>GA5</b>	<b>GA6</b>	<b>GA7</b>	<b>GA8</b>	<b>GA9</b>	<b>GA10</b>
<b>CO 1</b>	3	2		1	1				1	
<b>CO 2</b>	3	2		1					1	
<b>CO 3</b>	3	2		1					1	0
<b>CO 4</b>	3	2		1	1				1	0
<b>CO 5</b>	3	2		1	1				1	0
	15	10	0	5	3	0	0	0	0	5

*1 - Low , 2 – Medium , 3- high*

<b>XBC505A</b>			<b>COMPUTER GRAPHICS</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.5</b>	<b>0.5</b>	<b>0</b>					<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b> XBC103										
On the successful completion of the course, students will be able to										
<b>Course Outcome</b>					<b>Domain</b>		<b>Level</b>			
<b>CO1</b>	<i>State</i> the basics of graphics and <i>identify</i> how they can be used in computer.				<b>Cognitive</b>		Knowledge , Analyze			
<b>CO2</b>	<i>Recall</i> and <i>distinguish</i> the various 2-D Geometrical transforms and their applications.				<b>Cognitive</b>		Knowledge, Comprehension			
<b>CO3</b>	<i>Explain</i> the basic elements of 3-D Object representation, and <i>identify</i> various 3D transformation techniques				<b>Cognitive</b>		Comprehension, Analysis			
<b>CO4</b>	<i>Know</i> about visible surface detection methods				<b>Cognitive</b>		Knowledge			
<b>CO5</b>	<i>Construct</i> various computer animation methods and <i>choose</i> animation for an application.				<b>Psychomotor</b>		Perception, Set			
<b>UNIT - I :</b>		<b>Introduction</b>					<b>9</b>			
Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood fill algorithms.										
<b>UNIT - II :</b>		<b>2-D Geometrical transforms</b>					<b>9</b>			
Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems. 2-D Viewing: The viewing pipeline, viewing coordinate reference frame, window to viewport coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.										
<b>UNIT - III :</b>		<b>3-D Object representation</b>					<b>9</b>			



<b>CO3</b>	1	2	3	0	0	2	<b>0</b>	2	2
<b>CO4</b>	1	2	3	1	0	2	<b>0</b>	1	2
<b>CO5</b>	0	3	0	1	0	2	<b>0</b>	1	2
<b>Average</b>	1	2	2	1	0	2	<b>0</b>	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC505B</b>			<b>DIGITAL IMAGE PROCESSING</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>					<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b> Digital Principles										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Understand</i> image formation and the role human visual system plays in perception of gray and color image data.					Cognitive		Understand		
<b>CO2</b>	<i>Use</i> of various applications of image processing in industry, medicine, and defense.					Cognitive		Apply		
<b>CO3</b>	<i>Relate</i> the signal processing algorithms and techniques in image enhancement and image restoration.					Cognitive		Remember		
<b>CO4</b>	<i>Acquire</i> an appreciation for the image processing issues and techniques and be able to apply these techniques to real world problems.					Cognitive		Apply		
<b>CO5</b>	<i>Study</i> independent study and analysis of image processing problems and techniques.					Cognitive		Remember		
<b>UNIT I</b>			<b>INTRODUCTION TO IMAGE PROCESSING SYSTEM</b>				<b>9</b>			
Introduction to image processing system-image sampling-quantization-resolution-human visual system-classification of digital images-image types-elements of an image processing system-image										

fil formats-application of digital image processing. Image transforms-Need for transform-image transforms-Fourier transform-DCT-DFT.			
<b>UNIT II</b>	<b>IMAGE ENHANCEMENT</b>		<b>9</b>
Introduction-image enhancement in spatial domain-enhancement through point operation-types of point operation-histogram manipulation-linear gray-level transformation-nonlinear gray level transformation-local or neighborhood operation-median filter-spatial domain high-pass filtering or image sharpening-bit-plane slicing-image enhancement in the frequency domain-homomorphic filter-zooming operation.			
<b>UNIT III</b>	<b>IMAGE RESTORATION AND DENOISING</b>		<b>9</b>
Introduction-image degradation-types of image blur-classification of image-restoration techniques-image-restoration model-linear image restoration techniques-Non-linear image restoration techniques-image denoising-classification of noise in image-Median filtering-Trimmed average filter-performance metrics in image restoration-applications of digital image restoration.			
<b>UNIT IV</b>	<b>IMAGE SEGMENTATION</b>		<b>9</b>
Introduction-classification of image –segmentation techniques-region approach to image segmentation-clustering techniques-image segmentation based on thresholding-edge based segmentation-classification of edges-edge detection-edge linking-hough transform-active contour-Watershed transformation-shape representation-classification of shape representation techniques.			
<b>UNIT V</b>	<b>OBJECT RECOGNITION</b>		<b>9</b>
Introduction-need for an object recognition system-automated object recognition system-patterns and pattern class-selection of measurement parameters-relationship between image processing and object recognition-approaches to object recognition –template matching based object recognition-structural pattern recognition-applications of object recognition. Case study implementation of Matlab in image processing.			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	-	-	<b>45</b>
<b>REFERENCES:</b>			
Digital Image Processing by S.Jayaraman, S.Esakkirajan, T.Veerakumar, published by Tata McGraw Hill Education private ltd,3 <sup>rd</sup> reprint 2010. Fundamentals of Digital Image processing by Anil K.Jain published by Prentice-hall of India pvt ltd, 3 <sup>rd</sup> reprint 2004. Digital Image Processing by Rafael C.Gonzalez, Richard E.Woods, published by Pearson Prentice Hall,3 <sup>rd</sup> Edn. Milan Sonka, Vaclav Hlavac and Roger Boyle,“Image Processing, Analysis and Machine Vision”,Second Edition, Thomson Learning, 2001.			



**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3	2	3	2	2	1	1	1	3
<b>CO2</b>	2	3	2	3	1	1	1	2	3
<b>CO3</b>	3	2	3	2	2	2	1	2	3
<b>CO4</b>	3	2	2	3	1	1	1	1	3
<b>CO5</b>	2	3	2	2	2	2	1	2	3

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No relation

<b>1.8 XBC505</b>	<b>C</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
				<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>GAME PROGRAMMING</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
				<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>					
<b>2.8</b>	<b>0</b>	<b>0.2</b>					
<b>PREREQUISITE:</b> Programming skill							
<b>OBJECTIVE:</b>							
<ul style="list-style-type: none"> <li>Understand the concepts of Game design and development.</li> <li>Learn the processes, mechanics and issues in Game Design.</li> <li>Be exposed to the Core architectures of Game Programming.</li> <li>Know about Game programming platforms, frame works and engines.</li> <li>Learn to develop games.</li> </ul>							
<b>COURSE OUTCOMES</b>				<b>DOMAIN</b>		<b>LEVEL</b>	
After the completion of the course, students will be able to							
<b>CO1</b>	<i>Describe</i> the concepts of Game design and development.			Cognitive		Remember	

<b>CO2</b>	<i>Explain</i> the processes, and use mechanics for game development.	Cognitive	Understand
<b>CO3</b>	<i>Express</i> the Core architectures of Game Programming.	Cognitive	Understand
<b>CO4</b>	<i>Use</i> Game programming platforms, frame works and engines.	Cognitive	Apply
<b>CO5</b>	Create interactive Games.	Cognitive	Create
<b>UNIT I</b>	<b>3D GRAPHICS FOR GAME PROGRAMMING</b>		<b>9</b>
3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-based Simulation, Scene Graphs.			
<b>UNIT II</b>	<b>GAME ENGINE DESIGN</b>	<b>12</b>	<b>9</b>
Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling.			
<b>UNIT III</b>	<b>GAME PROGRAMMING</b>		<b>9</b>
Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management.			
<b>UNIT IV</b>	<b>GAMING PLATFORMS AND FRAMEWORKS</b>		<b>9</b>
2D and 3D Game development using Flash, DirectX, Java, Python, Game engines – DX Studio, Unity			
<b>UNIT V</b>	<b>GAME DEVELOPMENT</b>	<b>12</b>	<b>9</b>
Developing 2D and 3D interactive games using DirectX or Python – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>15</b>	<b>-</b>	<b>60</b>
<b>REFERENCES:</b>			
<b>TEXT BOOKS:</b>			
<ol style="list-style-type: none"> <li>1. Mike McShaffrfy and David Graham, “Game Coding Complete”, Fourth Edition, Cengage Learning, PTR, 2012.</li> <li>2. Jason Gregory, “Game Engine Architecture”, CRC Press / A K Peters, 2009.</li> <li>3. David H. Eberly, “3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics” 2nd Editions, Morgan Kaufmann, 2006.</li> </ol>			
<b>REFERENCES:</b>			

1. Ernest Adams and Andrew Rollings, "Fundamentals of Game Design", 2nd Edition Prentice Hall / New Riders, 2009.
2. Eric Lengyel, "Mathematics for 3D Game Programming and Computer Graphics", 3rd Edition, Course Technology PTR, 2011.
3. Jesse Schell, The Art of Game Design: A book of lenses, 1st Edition, CRC Press, 2008.

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc.	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3	2	1	1	0	1	<b>0</b>	1	1
<b>CO2</b>	0	1	3	2	0	2	<b>0</b>	2	2
<b>CO3</b>	1	2	3	0	0	2	<b>0</b>	2	2
<b>CO4</b>	1	2	3	1	0	2	<b>0</b>	1	2
<b>CO5</b>	0	3	0	1	0	2	<b>0</b>	1	2
<b>Average</b>	1	2	2	1	0	2	<b>0</b>	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

			<b>Angular JS</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>0.5</b>	<b>0.5</b>	<b>0</b>					<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>
<b>PREREQUISITE:</b> Nil										
<b>COURSE OUTCOMES:</b>										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		

After the completion of the course, students will be able to

<b>CO1: Recognize</b> the fundamentals and techniques of Angular JS.	Cognitive	Remember
<b>CO2: Express</b> the knowledge on Invoking, MVC, Validation, Communication over http, cookies and file upload in AngularJS	Cognitive Psychomotor	Understand Guided Response

Introduction to AngularJS - Invoking Angular - Model View Controller - Formatting Data with Filters - Changing Views with Routes and \$location - Validating User Input - Project Organization - Tools - Running Your Application - Testing with AngularJS - Relationship Between Model, Controller, and Template - Communicating Over \$http - Directives and HTML Validation - API Overview - Communicating Between Scopes with \$on, \$emit, and \$broadcast - Cookies - Internationalization and Localization - Wrapping a jQueryDatepicker - File Upload in AngularJS

Lab:

Create single page web applications using the MVC pattern of AngularJS

Understand the programming model provided by the AngularJS framework

Define Angular controllers and directives

Control Angular data bindings

LECTURE	TUTORIAL	PRACTICAL	TOTAL
0	7	8	15

**TEXTBOOKS**

Brad Green, ShyamSeshadri "AngularJS", O'Reilly Media, 2013.

Ken Williamson "Learning AngularJS: A Guide to AngularJS Development" O`reilly Media, 2015.

**REFERENCES**

Diego Netto, ValeriKarpov Professional Angularjs : A Concise Approach Wiley 2015

**E-REFERENCES**

<https://www.w3schools.com/angular/>

[www.tutorialsteacher.com/angularjs/angularjs-tutorials](http://www.tutorialsteacher.com/angularjs/angularjs-tutorials)

<b>XBC601</b>	<b>CLOUD COMPUTING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

C	P	A	L	T	P	H
2.5	0.5	0	3	0	0	3
<b>PREREQUISITE:</b>						
<b>Course Outcomes</b>			<b>Domain</b>		<b>Level</b>	
After the completion of the course, students will be able to						
<b>CO1</b>	<i>Recognize</i> the importance of cloud computing behind all communications and day to day life activities.		Cognitive	Remember		
			Psychomotor	Perception		
<b>CO2</b>	<i>Express</i> the functionalities of each cloud services and aware of the various cloud service providers		Cognitive	Understand		
<b>CO3</b>	<i>Employ</i> the understanding of the various scheduling activities and actively <i>participate</i> in terms for the creation of various cloud services.		Cognitive	Apply		
				Respond		
<b>CO4</b>	<i>Utilize</i> the cloud services tools effectively in the real world applications.		Cognitive	Apply		
<b>CO5</b>	<i>Design</i> and <i>Establish</i> the cloud services and cloud storage		Cognitive	Create		
			Psychomotor	Set		
<b>UNIT I</b>	<b>UNDERSTANDING CLOUD COMPUTING</b>				<b>9</b>	
Cloud Computing – History of Cloud Computing – Cloud Architecture – Cloud Storage – Need for Cloud Computing – Advantages and Disadvantages of Cloud Computing – Companies in the Cloud Today – Cloud Services.						
<b>UNIT II</b>	<b>DEVELOPING CLOUD SERVICES</b>				<b>9</b>	
Web-Based Application – Pros and Cons of Cloud Service Development – Types of Cloud Service Development – Software as a Service – Platform as a Service – Web Services – On Demand Computing – Discovering Cloud Services Development Services and Tools – Amazon Ec2 – Google App Engine – IBM Clouds						
<b>UNIT III</b>	<b>USING CLOUD SERVICES</b>				<b>9</b>	
Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications – Exploring Online Planning and Task Management – Collaborating on Event Management – Collaborating on Contact Management – Collaborating on Project Management – Collaborating on Word Processing – Collaborating on Databases – Storing and Sharing Files.						

<b>UNIT IV</b>	<b>OUTSIDE THE CLOUD</b>			<b>9</b>
Evaluating Web Mail Services – Evaluating Instant Messaging – Evaluating Web Conference Tools– Creating Groups on Social Networks – Evaluating on Line Groupware – Collaborating via Blogs and Wikis				
<b>UNIT V</b>	<b>STORING AND SHARING</b>			<b>9</b>
Understanding Cloud Storage – Evaluating on Line File Storage – Exploring on Line Book Marking Services – Exploring on Line Photo Editing Applications – Exploring Photo Sharing Communities– Controlling it with Web Based Desktops.				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>	
<b>45</b>	<b>--</b>	<b>--</b>	<b>45</b>	
<b>TEXTBOOKS</b>				
1. Michael Miller, —Cloud Computingl, Pearson Education, New Delhi, 2009.				
<b>REFERENCES:</b>				
1. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On–demand Computingl, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.				
<b>E-REFERENCES</b>				
1. <a href="http://www.cloudbus.org/cloudsim">www.cloudbus.org/cloudsim</a> 2. <a href="https://cloudacademy.com">https://cloudacademy.com</a>				

#### Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	2	2	2	2	2	1	1	2	2
<b>CO2</b>	2	3	3	3	3	1	1	3	2
<b>CO3</b>	2	3	3	3	3	1	1	3	2
<b>CO4</b>	2	3	3	3	3	1	1	3	2
<b>CO5</b>	2	3	3	3	3	1	1	3	2
<b>Average</b>	2	3	3	3	3	1	1	3	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>XBC602</b>			<b>WEB TECHNOLOGIES</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>1</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.8</b>	<b>1</b>	<b>0.2</b>					<b>3</b>	<b>0</b>	<b>2</b>	<b>5</b>
<b>PREREQUISITE:</b> XBC103, XBC301										
<b>COURSE OUTCOMES</b>						<b>DOMAIN</b>		<b>LEVEL</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Recognize</i> the significance of Web Technology.					Cognitive Psychomotor		Remember Perception		
<b>CO2</b>	<i>Express</i> the knowledge on HTML, CSS and JavaScript and PHP in Web Design.					Cognitive		Understand		
<b>CO3</b>	<i>Employ</i> the understanding of the Client and Server side scripts and actively <i>participate</i> in teams for the creation of static and dynamic web pages.					Cognitive Affective		Apply Respond		
<b>CO4</b>	<i>Utilize</i> the web designing tools effectively in the real world applications.					Cognitive		Apply		
<b>CO5</b>	<i>Design</i> and <i>Establish</i> the Website or Web based Software.					Cognitive Psychomotor		Create Set		
<b>UNIT I</b>		<b>INTRODUCTION TO WEB TECHNOLOGY &amp; HTML</b>						<b>9+3+6</b>		
Introduction to Web Technology – Concept of Tier – Web Pages – Static Web Pages – Dynamic Web Pages – HTML Basics – HTML CSS – Links – Images – Tables – Lists - Frames - HTML forms and Input tags										
<b>Lab:</b> 1. Formatting tags, ordered list and unordered list.										
2.Tables, frame, image map and hyperlink.										
<b>UNIT II</b>		<b>CSS &amp; JAVASCRIPT</b>						<b>9+3+6</b>		

CSS Basics – Texts and Fonts – Links, Lists and Tables – Border and Outline – Position – Dimension and Display - Java Script Basics – Functions – Events – Conditional and Looping Statements – Forms

**Lab:**1.Font, color and style

2. Background and Links

3.Form Validation

4.Looping and Conditional Statements

<b>UNIT III</b>	<b>PHP BASIC CONCEPTS</b>	<b>9+3+6</b>
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PHP - Basic Syntax – Data Types – Variables & Constants in PHP - String and Operators - Selective and Iterative flow of controls - PHP arrays & types - PHP function declaration - adding parameters - Server side includes - Built in functions

**Lab:**1. Strings and Operators

2.Flow of controls and Arrays

3.PHP Forms

4.PHP Functions

<b>UNIT IV</b>	<b>PHP ADVANCED CONCEPTS</b>	<b>9+3+6</b>
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PHP File Handling - Opening a File - Closing a File - Check End-Of-File - Reading a File Line By Line - Reading File Character By Character - PHP File Upload - Exception Handling - Creating Custom Exception Class - Re-Throwing Exceptions - Cookies - Sessions - E-Mails

**Lab:**1.File Handling

2.Exception Handling

3. PHP Sessions and Cookies

<b>UNIT V</b>	<b>PHP &amp; MySQL</b>	<b>9+3+6</b>
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MySQL Database – Connect – Create DB – Create Table – Insert Data – Get Last ID – Insert Multiple - Select Data – Delete Data – Update Data – Limit Data

**Lab:**PHP with MySQL

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	15	30	90



**TEXT BOOKS:**

AchyutS.Godbole, AtulKahate, “Web Technologies TCP/IP To Internet Application Architectures”, First Edition, Tata McGraw-Hill Publishing Company Limited, 2003.  
 Elizabeth Castro, Bruce Hyslop, “HTML 5 and CSS 3”, Eight Edition, Peachpit Press, 2015.  
 Thomas A. Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Second Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2008.  
 Kevin Tatroe, Peter MacIntyre and RasmusLerdorf, “Programming PHP”, Third Edition, O’Reilly Media, Inc., 2015.

**REFERENCES:**

N.P. Gopalan, J.Akilandeswari, “Web Technology: A Developer’s Perspective”, Second Edition, PHI Learning Private Limited, 2014.  
 Thomas A. Powell, “HTML & CSS: The Complete Reference”, Fifth Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2010.

**E-REFERENCES:**

[www.php.net/manual/en/intro-what-is.php](http://www.php.net/manual/en/intro-what-is.php)  
[www.w3schools.com](http://www.w3schools.com)  
[www.tutorialspoint.com](http://www.tutorialspoint.com)

**Table 1: Mapping of COs with POs**

Course Outcomes	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	2	0	1	1	0	1	0	1	2
<b>CO2</b>	2	2	2	1	1	0	1	2	3
<b>CO3</b>	1	2	2	1	2	1	1	2	3
<b>CO4</b>	0	1	2	2	2	1	0	2	3
<b>CO5</b>	1	2	3	2	3	2	1	3	3
<b>Average</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>

1-5 → 1, 6-10 → 2, 11-15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC603</b>	<b>ETHICAL HACKING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>

<b>C</b>	<b>P</b>	<b>A</b>	<b>L</b>	<b>T</b>
<b>2.8</b>	<b>1</b>	<b>0.2</b>	<b>2</b>	<b>1</b>
			<b>0</b>	<b>3</b>

**PREREQUISITE:**

<b>COURSE OUTCOMES</b>	<b>DOMAIN</b>	<b>LEVEL</b>
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After the completion of the course, students will be able to

<b>CO1</b>	<i>Recognize</i> the significance of HACKING.	Cognitive Psychomotor	Remember Perception
<b>CO2</b>	<i>Express</i> the knowledge on information gathering and port scanning techniques	Cognitive	Understand
<b>CO3</b>	<i>Employ</i> the understanding of the vulnerability assessment <i>participate</i> in teams for the network sniffing	Cognitive Affective	Apply Respond
<b>CO4</b>	<i>Utilize</i> the exploitation technique effectively in the real world applications.	Cognitive	Apply
<b>CO5</b>	<i>Design</i> and <i>Establish</i> the wireless & web hacking.	Cognitive Psychomotor	Create Set

<b>UNIT I</b>	<b>INTRODUCTION TO HACKING</b>	<b>9</b>
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Terminologies, Categories of Penetration Test, Writing Reports, Structure of a Penetration Testing Report, Vulnerability Assessment Summary, Risk Assessment, Methodology, Linux Basics: File Structure, Cron Job, Users, Common Applications , BackTrack, Services

<b>UNIT II</b>	<b>INFORMATION GATHERING, TARGET ENUMERATION AND PORT SCANNING TECHNIQUES</b>	<b>9</b>
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Active, Passive and Sources of information gathering, Copying Websites Locally, NeoTrace, Cheops-ng, Intercepting a Response, WhatWeb, Netcraft, Basic Parameters, Xcode Exploit Scanner, Interacting with DNS Servers, Fierce, Zone Transfer with Host Command and Automation, DNS Cache Snooping- Attack Scenario, Automating Attacks, SNMP - Problem, Sniffing Passwords, SolarWinds Toolset, sweep, Brute Force and Dictionary- Tools , Attack, Enumeration, Intelligence Gathering Using Shodan, Target enumeration and Port Scanning Techniques.

<b>UNIT III</b>	<b>VULNERABILITY ASSESSMENT &amp; NETWORK SNIFFING</b>	<b>9</b>
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Introduction to Vulnerability Assessment - Pros and Cons, NMap, Updation of database, Testing SCADA Environments with Nmap, Nessus, Sniffing: Types, Hubs versus Switches, Modes, MITM

Attacks, ARP Protocol Basics- working, Attacks, DoS Attacks, Dsniff tool, Using ARP Spoof to Perform MITM Attacks, Sniffing the Traffic with Dsniff, Sniffing Pictures with Drifnet, Urlsnarf and Webspay, Sniffing with Wireshark, Ettercap- ARP Poisoning, Hijacking Session with MITM Attack, ARP Poisoning with Cain and Abel, Sniffing Session Cookies with Wireshark, Hijacking the Session, SSL Strip: Stripping HTTPS Traffic, Requirements, Automating Man in the Middle Attacks, DNS Spoofing, DHCP Spoofing.

<b>UNIT IV</b>	<b>BASICS OF EXPLOITATION</b>	<b>9</b>
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Remote Exploitation : Understanding Network Protocols, Attacking Network Remote Services, Common Target Protocols, tools for cracking network remote services, Attacking SMTP, Attacking SQL Servers, Client Side Exploitation Methods: E-Mails Leading to Malicious Attachments & Malicious Links, Compromising Client Side Update, Malware Loaded on USB Sticks, Postexploitation: Acquiring Situation Awareness, Privilege Escalation, Maintaining Access, Data Mining, Identifying and Exploiting Further Targets, Windows Exploit Development Basics.

<b>UNIT V</b>	<b>WIRELESS &amp; WEB HACKING</b>	<b>9</b>
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Wireless Hacking: Requirements, Aircracking, Hidden SSIDs, Monitor Mode, Monitoring Tool- Beacon Frames on Wireshark, Airodump-ng, Wireless Adapter in Monitor Mode, Determining the Target, Cracking a WPA/WPA2 Wireless Network Using Aircrack-ng, Capturing Packets and Four-Way Handshake, Web Hacking: Attacking the Authentication, Brute Force and Dictionary Attacks, Types of Authentication, Crawling Restricted Links, Testing for the Vulnerability, Authentication Bypass with Insecure Cookie Handling, SQL injection, XSS – DOM based, BeEF, CSRF, Bypassing CSRF and BeEF with XSS, Vulnerability in FCKeditor, efront.

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>30</b>	<b>15</b>		<b>45</b>

**TEXT BOOKS:**

1. RafayBaloch, “Ethical Hacking and Penetration Testing Guide”, CRC Press, 2015.

**REFERENCES:**

1. Patrick Engebretson, “The Basics of Hacking and Penetration Testing : Ethical Hacking and Penetration Testing Made Easy”, Syngress Media, Second Revised Edition, 2013.
2. Michael T. Simpson, Kent Backman, James E. Corley, “Hands On Ethical Hacking and Network Defense”, Cengage Learning, 2012.

**E-REFERENCES:**

[https://www.tutorialspoint.com/ethical\\_hacking/](https://www.tutorialspoint.com/ethical_hacking/)

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc.	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	1	1	0	1	0	1	1
CO2	0	1	3	2	0	2	0	2	2
CO3	1	2	3	0	0	2	0	2	2
CO4	1	2	3	1	0	2	0	1	2
CO5	0	3	0	1	0	2	0	1	2
Average	1	2	2	1	0	2	0	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XBC604A			INTERNET OF THINGS				L	T	P	C
							3	0	0	3
C	P	A	L	T	P	H				
2.5	0.5	0	3	0	0	3				
<b>PREREQUISITE:</b> Computer Networks										
Course Outcomes						Domain		Level		
After the completion of the course, students will be able to										
CO1	<i>Identify</i> the components of IOT and learn the basic issues, policy and challenges in the Internet					Cognitive Psychomotor		Remember Perception		
CO2	<i>Design</i> the portable device , program the sensors and microcontrollers					Cognitive		Create		
CO3	<i>Perceive</i> the significance of <i>building</i> the software agents in the real time environments					Cognitive Psychomotor		Create Perception		
CO4	<i>Formulate</i> and <i>Establish</i> the cloud based communication through wifi/ Bluetooth					Cognitive Psychomotor		Create Set		

<b>CO5</b>	<i>Combine</i> the needed internet resources and implement in the business model	Cognitive	Analyze
<b>UNIT I</b>	<b>INTRODUCTION</b>		<b>9</b>
Definition – phases – Foundations – Policy– Challenges and Issues - identification - security – privacy. Components in internet of things: Control Units – Sensors – Communication modules – Power Sources – Communication Technologies – RFID – Bluetooth – Zigbee – Wifi – Rflinks – Mobile Internet – Wired Communication			
<b>UNIT II</b>	<b>PROGRAMMING THE MICROCONTROLLER FOR IOT</b>		<b>9</b>
Basics of Sensors and actuators – examples and working principles of sensors and actuators – Cloud computing and IOT – Arduino/Equivalent Microcontroller platform – Setting up the board - Programming for IOT – Reading from Sensors Communication:Connecting microcontroller with mobile devices – communication through bluetooth and USB – connection with the internet using wifi / ethernet			
<b>UNIT III</b>	<b>IOT PROTOCOLS</b>		<b>9</b>
Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security			
<b>UNIT IV</b>	<b>WEB OF THINGS</b>		<b>9</b>
Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture			
<b>UNIT V</b>	<b>INTERNET OF EVERYTHING</b>		<b>9</b>
Differences Internet of Things and Internet of Everything – IoE at a glance –Internet of Everything: Data, Networks and opportunities-Application - IoE for cities connecting people, process and data			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>			<b>45</b>
<b>REFERENCES:</b>			
1. CharalamposDoukas , Building Internet of Things with the Arduino, Create space, April 2002			
2. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011			

3. Luigi Atzor et.al, “The Internet of Things: A survey, “, Journal on Networks, Elsevier Publications, October, 2010
4. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011
5. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010 4.
- 6.The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
7. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012
8. <http://postscapes.com/>
9. <http://www.theinternetofthings.eu/what-is-the-internet-of-things>

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	1	2	2	1	1	0	0	1	2
<b>CO2</b>	1	3	1	2	2	0	1	2	2
<b>CO3</b>	0	3	1	2	2	1	1	2	2
<b>CO4</b>	0	3	0	2	2	0	1	2	2
<b>CO5</b>	0	3	2	1	3	1	1	3	2
<b>Average</b>	1	2	1	2	2	1	1	2	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC604B</b>			<b>CLIENT SERVER COMPUTING</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>

<b>3</b>	<b>0</b>	<b>0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b> XBC103, XBC402							
<b>Course Outcomes</b>				<b>Domain</b>	<b>Level</b>		
After the completion of the course, students will be able to							
<b>CO1</b>	<i>Understand</i> the basics of client server computing			Cognitive	Remember		
<b>CO2</b>	<i>Identify</i> Client server architecture, elements and components of computer system. <i>Analysis</i> the performance of computer and efficiency of internal elements.			Cognitive	Knowledge Analysis		
<b>CO3</b>	<i>Analyze</i> the Database connectivity and support required for Client server system			Cognitive	Analysis		
<b>CO4</b>	<i>recognize</i> the application of client server computing using Visual C++.			Cognitive	Knowledge Analysis		
<b>CO5</b>	<i>associate</i> with Multiple document interface.			Cognitive	Comprehension		
<b>UNIT I</b>	<b>Introduction</b>					<b>9</b>	
Basic concepts of Client / Server – Upsizing Downsizing – Right sizing – Characteristics – File server – Database servers – Transactions servers – Groupware servers – Object Client/Servers – Web Servers – Middleware. Client / Server building blocks – Operating System services – Base services – External services – server scalability – Remote procedure calls – Multiservers.							
<b>UNIT II</b>	<b>SERVER ARCHITECTURE</b>					<b>9</b>	
SQL Database servers – server architecture – Multithread architecture – Hybrid architecture – stored Procedures – Triggers – Rules – Client / Server Transaction Processing – Transaction models – Chained and nested transactions – Transaction processing monitors – Transaction Management Standards.							
<b>UNIT III</b>	<b>DATABASE CONNECTIVITY</b>					<b>9</b>	
Database Connectivity solutions : ODBC – The need for Database connectivity – Design overview of ODBC – Architecture – components – Applications – Driver Managers – Drivers – Data sources – ODBC 2.5 and ODBC 3.0.							
<b>UNIT IV</b>	<b>VISUAL C++</b>					<b>9</b>	
Visual C++: The Windows Programming Model – GDI – resource based programming – DLL and OLE Applications – Visual C++ components – frame work / MFC class Library – basic							

event handling – SDI – Appwizard – ClassWizard – Model and Models dialogues – other controls – Examples.

<b>UNIT V</b>	<b>MDI</b>			<b>9</b>
Multiple Document Interface – Data Management with Microsoft ODBC – OLE client – OLE server – Client / Server Data Exchange format – Dynamic Data Exchange.				
<b>LECTURE</b>	<b>TUTORIAL</b>		<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>-</b>		<b>-</b>	<b>45</b>
<b>TEXTBOOKS:</b>				
Robert Orfali, Dan Harkey and Jerri Edwards, Essential Client / Server Survival Guide, John Wiley and sons Inc. 1998.				
<b>REFERENCES:</b>				
David J. Kruglinski, Inside Visual C++, Microsoft Press 1992. Boar, B.H., Implementing Client / Server Computing ; A Strategic Perspective, Mcraw Hill, 1993. Bouce Elbert, Client / Server Computing, Artech. Press, 1994. Alex Berson, Client / Server Architecture, McGraw Hill, 1996.				
<b>E-REFERENCES:</b>				
<a href="http://fivedots.coe.psu.ac.th/~suthon/csw/01%20-%20Client%20Server%20Computing.pdf">fivedots.coe.psu.ac.th/~suthon/csw/01%20-%20Client%20Server%20Computing.pdf</a> <a href="http://www.bcanotes.com/Download/DBMS/Rdbms/Client_Server%20Computing.pdf">www.bcanotes.com/Download/DBMS/Rdbms/Client_Server%20Computing.pdf</a>				

### Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	1	1	2	1	1	1	1	2	1
<b>CO2</b>	1	2	1	1	1	1	1	2	1
<b>CO3</b>	1	1	2	1	1	1	1	2	1
<b>CO4</b>	1	2	1	1	1	1	1	1	1
<b>CO5</b>	1	1	3	2	1	1	2	1	1
<b>Average</b>	1	1	2	1	1	1	1	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation



<b>XBC604C</b>			<b>ARTIFICIAL INTELLEGEENCE</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.8</b>	<b>0</b>	<b>0.2</b>					<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b> Data Structures and Algorithms, Problem Solving Using C										
<b>OBJECTIVE:</b>										
<ul style="list-style-type: none"> <li>• Study the concepts of Artificial Intelligence.</li> <li>• Learn the methods of solving problems using Artificial Intelligence.</li> <li>• Introduce the concepts of Expert Systems and Machine Learning.</li> </ul>										
<b>COURSE OUTCOMES</b>						<b>DOMAIN</b>	<b>LEVEL</b>			
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Identify</i> problems that are amenable to solution by AI methods					Cognitive	Remember			
<b>CO2</b>	<i>Identify</i> appropriate AI methods to solve a given problem.					Cognitive	Remember			
<b>CO3</b>	<i>Apply</i> the given problem in the language/framework of different AI methods.					Cognitive	Apply			
<b>CO4</b>	<i>Implement</i> basic AI algorithms.					Cognitive	Apply			
<b>CO5</b>	<i>Design</i> and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.					Cognitive	Analyze			
<b>UNIT I</b>		<b>INTRODUCTION TO AI AND PRODUCTION SYSTEMS</b>						<b>9</b>		
Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics - Specialized productions system- Problem solving methods – Problem graphs, Matching, Indexing										

and Heuristic functions -Hill Climbing-Depth first and Breadth first, Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms.

<b>UNIT II</b>	<b>REPRESENTATION OF KNOWLEDGE</b>	<b>9</b>
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Game playing – Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

<b>UNIT III</b>	<b>KNOWLEDGE INFERENCE</b>	<b>9</b>
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Knowledge representation -Production based system, Frame based system. Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning – Certainty factors, Bayesian Theory-Bayesian Network-Dempster – Shafer theory.

<b>UNIT IV</b>	<b>PLANNING AND MACHINE LEARNING</b>	<b>9</b>
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Basic plan generation systems – Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.

<b>UNIT V</b>	<b>EXPERT SYSTEMS</b>	<b>9</b>
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Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems – MYCIN, DART, XOON, Expert systems shells.

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>-</b>	<b>-</b>	<b>45</b>

**TEXT BOOKS:**

1. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, McGraw Hill- 2008. (Units-I,II,VI & V)
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III).

**REFERENCES:**

1. Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007.
3. Deepak Khemani “Artificial Intelligence”, Tata McGraw Hill Education 2013.

**E-REFERENCES:**<http://nptel.ac.in>**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>YSE605A</b>			<b>SOFTWARE TESTING AND QUALITY ASSURANCE</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2</b>	<b>1</b>	<b>0</b>					<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b> Software Engineering										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<b>Recognize</b> the software quality assurance plan					Cognitive		Remember		
<b>CO2</b>	<b>Demonstrate</b> the software Testing concepts.					Cognitive		Understand		
<b>CO3</b>	<b>Analyze</b> the different testing strategies and methods for					Cognitive		Analyze		

	test case design.		
<b>CO4</b>	<b>Identify</b> the levels of testing and management.	Psychomotor	Perception
<b>CO5</b>	<b>Describe</b> various test process.	Psychomotor	Perception
<b>UNIT I</b>	<b>INTRODUCTION TO SOFTWARE QUALITY ASSURANCE PLAN</b>		<b>12</b>
<p>An overview of software quality assurance plan- Software quality assurance plan purpose and scope – Software quality assurance management- Problem reporting and corrective action-Tools, Techniques and Methodologies-Risk Management.</p> <p><b>Lab:</b> 1. Preparation of project management plan.</p> <p>2. Preparation of Requirement Management plan using any case tools.</p>			
<b>UNIT II</b>	<b>INTRODUCTION TO SOFTWARE TESTING</b>	<b>12</b>	<b>12</b>
<p>Introduction to testing as an Engineering Activity – The evolving process of Software Engineering – The role of process in software quality – Testing as a process – Overview of the testing maturity model (TMM) – Testing fundamentals – Defects , hypothesis and tests.</p>			
<b>UNIT III</b>	<b>STRATERGIES AND METHODS FOR TEST CASE DESIGN</b>	<b>12</b>	<b>12</b>
<p>Introduction to testing design strategies- The smart tester – Test case design strategies – Using black box approach to test case design – Random testing – Equivalence class partitioning boundary value analysis – strategies and methods for test case design II</p>			
<b>UNIT IV</b>	<b>LEVELS OF TESTING AND MANAGEMENT</b>	<b>12</b>	<b>12</b>
<p>The need for levels of testing – Unit test – Planning – Designing the unit tests –The test harness Integration test goals, strategies, design plan and documentation – The test organization</p>			
<b>UNIT V</b>	<b>CONTROLING AND MONITORING THE TEST PROCESS</b>	<b>12</b>	<b>12</b>
<p>Measurements and Milestones for controlling and monitoring – Software Configuration and management – Reviews as a testing activity - Defect analysis and prevention – Process control and Optimization – Need for Testing Maturity Model – Structure of testing maturity model – Relationships of the TMM to other process improvement models.</p>			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>

TEXT BOOK		
Ilene Burnstein, "Practical Software Testing ", Springer International Edition, Chennai 2003.		
<b>REFERENCES BOOKS</b>		
RenuRajani and Pradeep Oak " Software Testing – Effective Methods, Tools and Techniques" Tata McGraw Hill Publications New Delhi 2007.		
Elfriede Dustin, "Effective Software Testing "Pearson Education, New Delhi, 2003.		

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
<b>Average</b>	2	1	1	1	1	1	3	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC605B</b>			<b>SYSTEM ANALYSIS AND DESIGN</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>					<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b> Fundamentals of Computer										
<b>Course Outcomes</b>						<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to										
<b>CO1:</b> Define data information and system						Cognitive		Remember		
<b>CO2:</b> To explain the role of information system						Cognitive		Understand		

<b>CO3:</b> To understand the prototypes		Cognitive	Understand
<b>CO4:</b> To express the elements of design		Cognitive	Understand
<b>CO5:</b> To design the computer output		Cognitive	Understand
<b>UNIT I</b>	<b>INTRODUCTION</b>		<b>9</b>
UNIT – I Define Data, Information, System, System component, System Analysis, Business system concepts, Categories of Information System, Scope of Information System, System Development Life Cycle, system prototype.			
<b>UNIT II</b>	<b>ROLE OF INFORMATION SYSTEM</b>		<b>9</b>
Role of information system, Information system planning , Fact finding techniques, Tools for documenting procedure and decisions, Structured Analysis, Data flow analysis, Features and tools of data flow strategy, Advantage of data flow analysis, Physical and Logical data flow diagrams.			
<b>UNIT III</b>	<b>PROTOTYPES</b>		<b>9</b>
Data dictionary features, Processes in the Data dictionary, Application Prototype, Steps in prototype methods, Use of Prototypes, A Prototyping example, System Design, Objectives in Designing an information system, software development specification..			
<b>UNIT IV</b>	<b>ELEMENTS OF THE DESIGN</b>		<b>9</b>
Elements of the design, Design of output, Design of files, Design of Database Interaction, Design of Input, Design of control, Design of Procedure, Design of Program specification			
<b>UNIT V</b>	<b>DESIGN OF COMPUTER OUPUT</b>		<b>9</b>
Design of computer output, types of output, how to present information – Tabular format, Graphics format, color presentation, screen design, Design of Input and Output controls, data capture guideline, design of source documents.			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>
<b>TEXT BOOK</b>			
<ol style="list-style-type: none"> <li>1. System Analysis and Design – Awadh</li> <li>2. Analysis &amp; Design of Information system – James A. Senn –McGraw Hill</li> </ol>			

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>COURSE CODE</b>			<b>XBC605C</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>COURSE NAME</b>			<b>Management Information System</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>PREREQUISITE</b>			<b>-----</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>	
<b>C</b>	<b>P</b>	<b>A</b>	<b>3:0:0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>COURSE OUTCOMES</b>				<b>DOMAIN</b>		<b>LEVEL</b>		
<b>CO1</b>	<i>Recognize the fundamentals of Information Systems</i>			Cognitive		Remember		
<b>CO2</b>	<i>Identify the impact of information systems in organizations</i>			Cognitive		Remember		
<b>CO3</b>	<i>Represent IT infrastructure and database approach</i>			Cognitive		Understand		
<b>CO4</b>	<i>Generalize Telecommunications and Networking in Today's Business World</i>			Cognitive		Understand		
<b>CO5</b>	<i>Choose the suitable Business and Technology for E-Commerce</i>			Cognitive		Apply		
<b>UNIT I</b>		<b>Information Systems in Global Business Today</b>					<b>9</b>	
The Role of Information Systems in Business Today - Perspectives on Information Systems - Contemporary Approaches to Information Systems - Global E-Business and Collaboration - Business Processes and Information Systems - Types of Business Information Systems -								

Systems for Collaboration and Teamwork - The Information Systems Function in Business - Systems Function.			
<b>UNIT II</b>	<b>Information Systems, Organizations, and Strategy</b>		<b>9</b>
Organizations and Information Systems - How Information Systems Impact Organizations and Business Firms- Using Information Systems to Achieve Competitive Advantage- Understanding Ethical and Social Issues Related to Systems - Ethics in an Information Society - The Moral Dimensions of Information Systems			
<b>UNIT III</b>	<b>IT Infrastructure and Emerging Technologies</b>		<b>9</b>
IT Infrastructure - Infrastructure Components - Contemporary Hardware Platform Trends - Contemporary Software Platform Trends - Management Issues - Organizing Data in a Traditional File Environment - The Database Approach to Data Management - Using Databases to Improve Business Performance and Decision- Managing Data Resources.			
<b>UNIT IV</b>	<b>Telecommunications, the Internet, and Wireless Technology</b>		<b>9</b> <b>12</b>
Telecommunications and Networking in Today's Business World - Communications Networks - The Global Internet - The Wireless Revolution - Securing Information Systems - System Vulnerability and Abuse - Business Value of Security and Control Establishing a Framework for Security and Control.			
<b>UNIT V</b>	<b>E-Commerce: Digital Markets, Digital Goods</b>		<b>9</b>
E-commerce and the Internet - E-commerce: Business and Technology - The Mobile Digital Platform and Mobile E-commerce - Building an E-commerce Web Site- Decision Making and Information Systems - Business Intelligence in the Enterprise - Systems as Planned Organizational Change - Alternative Systems-Building Approaches .			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>
<b>TEXT BOOKS:</b>			
1.Kenneth C. Laudon,Jane P. Laudon ,2012,Management Information Systems: Managing The Digital Firm ,Twelfth Edition, Prentice Hall			
<b>REFERENCES :</b>			
1.James OBrien, George Marakas,2010, Management Information Systems, Tenth Edition,McGraw Hill Irwin			
2. 2.TerryLucey ,2005,Management Information Systems,NinthEdition,Thomson publication			
3.Effy Oz,1999, Management Information Systems, Second Edition,galgotiaPublications,New Delhi			



**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

<b>B.Sc CS</b>	<b>PO</b>							<b>PSO</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>2</b>
<b>CO1</b>	1	1	2	1	1	1	1	2	1
<b>CO2</b>	1	2	1	1	1	1	1	2	1
<b>CO3</b>	1	1	2	1	1	1	1	2	1
<b>CO4</b>	1	2	1	1	1	1	1	1	1
<b>CO5</b>	1	1	3	2	1	1	2	1	1
<b>Average</b>	1	1	2	1	1	1	1	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

#### 4. Curriculum and Syllabus for the B.Sc Computer Science (SE) programme – After Revision

##### CURRICULUM for B. Sc (Computer Science)

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
AECC 1	XGL101	Basic English Communication Skills	2	0	0	0	2	2	0	0	2	2+2
AECC 2	XGL102A/ XGL102B	Ariviyal Tamil/ Comprehensive English	2	0	0	0	2	2	0	0	0	2
CC-1A	XBC103	Programming Methodologies	3	1	1	1	6	3	1	3	1	7+1
CC-1B	XBC104	Algebra, Calculus & Analytical Geometry	4	1	0	1	6	4	1	0	1	5+1
CC-1C	XBC105	Computer Fundamentals	3	1	1	1	6	3	1	3	1	7+1
UMAN-1	XUM106	Human Ethics, Values, Rights, and Gender Equality	0	0	0	0	0	2	0	0	1	2+1
		<b>Total</b>	<b>14</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>22</b>	<b>16</b>	<b>3</b>	<b>6</b>	<b>6</b>	<b>25+6</b>

##### REGULATIONS – 2020

(Applicable to the students admitted from the Academic year 2020 - 2021)

##### I SEMESTER

##### II SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
AECC 3	XGL201	Advanced English Communication Skills	2	0	0	0	2	2	0	0	2	2+2
AECC 4	XES202	Environmental Studies	2	0	0	0	2	2	0	0	1	2+1
CC- 2A	XBC203	Data Structures	3	1	1	1	6	3	1	3	1	7+1
CC- 2B	XBC204	Discrete Mathematics	3	1	0	2	6	3	1	0	2	4+2
CC- 2C	XBC205	Digital Electronics	3	1	1	1	6	3	1	3	1	7+1
UMAN-2	XUM206	Disaster Management	0	0	0	0	0	3	0	0	0	3
		<b>Total</b>	<b>13</b>	<b>3</b>	<b>2</b>	<b>4</b>	<b>22</b>	<b>16</b>	<b>3</b>	<b>6</b>	<b>7</b>	<b>25+7</b>

### III SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
SEC-1B	XBC301	Multimedia Systems	3	0	1	0	4	3	0	2	0	5
CC-3A	XBC302	Operating System	4	1	0	1	6	4	1	0	1	5+1
CC-3B	XBC303	Algorithms	3	1	1	1	6	3	1	3	1	7+1
CC-3C	XBC304	Allied Physics	4	1	0	1	6	4	1	0	1	5+1
GE-1		*Open Elective - To be chosen by student	3	0	0	0	3	3	0	0	0	3

Minor Course * Extra Credit	XBC306	R Programming	1	0	0	0	1*	1	0	0	0	1
		<b>Total</b>					<b>25+</b>					
			<b>17+1</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>1*</b>	<b>17+1</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>25+3+1</b>

#### IV SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
SEC-2B	XBC401	Object Oriented Programming	3	0	1	0	<b>4</b>	3	0	2	0	5
CC - 4A	XBC402	Database Management Systems	3	1	1	1	<b>6</b>	3	1	3	1	7+1
CC - 4B	XBC403	Statistics	4	1	0	1	<b>6</b>	4	1	0	1	5+1
CC - 4C	XBC404	Principles of Management	4	1	0	1	<b>6</b>	4	1	0	1	5+1
GE-2		*Open Elective - To be chosen by student	3	0	0	0	<b>3</b>	3	0	0	0	3
Minor Course *Extra Credit	XBC406	Angular JS	1	0	0	0	<b>1*</b>	1	0	0	0	1
		<b>Total</b>	<b>17+1</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>25+1*</b>	<b>17+1</b>	<b>3</b>	<b>5</b>	<b>3</b>	<b>25+3+1</b>

## V SEMESTER

Category	Course Code	Course Name	Credits					Hours				
			L	T	P	SS	Total	L	T	P	SS	Total
SEC-3A	XBC501A	MATLAB Programming	3	0	1	0	4	3	0	2	0	5
	XBC501B	Programming in Java	3	0	1	0	4	3	0	2	0	5
	XBC501C	Python Programming	3	0	1	0	4	3	0	2	0	5
DSE-1A	XBC502A	Software Engineering	4	2	0	0	6	4	2	0	0	6
	XBC502B	Computer Ethics	4	2	0	0	6	4	2	0	0	6
	XBC502C	Computer Organization & Architecture	4	2	0	0	6	4	2	0	0	6
	XBC502D	Computer Networks	4	2	0	0	6	4	2	0	0	6
DSE-1B	XBC503A	.NET Technologies	3	2	1	0	6	3	2	3	0	8
	XBC503B	GIMP(GNU Image Manipulation Program)	3	2	1	0	6	3	2	3	0	8
	XBC503C	Theory of Computation	3	2	1	0	6	3	2	3	0	8
DSE-1C	XBC504A	Image Processing	4	2	0	0	6	4	2	0	0	6
	XBC504B	Internet Technologies	4	2	0	0	6	4	2	0	0	6
	XBC504C	System Security	4	2	0	0	6	4	2	0	0	6
	XBC505	IPT 21 Days	0	0	0	0	2	0	0	0	0	0



DSE-2B	XBC603A	Machine Learning	4	0	0	2	6	4	0	0	2	4+2
	XBC603B	Human Computer Interface	4	0	0	2	6	4	0	0	2	4+2
	XBC603C	Data Analytics	4	0	0	2	6	4	0	0	2	4+2
DSE-2C	XBC604	Project Work	0	0	6	0	6	0	0	12	0	12
			11	0	7	4	22	11	0	14	4	25+4

<b>XGL101</b>			<b>BASIC ENGLISH COMMUNICATION SKILLS</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
								<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>2</b>	<b>0</b>	<b>0</b>						<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>COURSE OUTCOMES:</b>								<b>Domain</b>	<b>Level</b>			
CO1	<i>Recall</i> the basic grammar and using it in proper context						Cognitive	Remembering				
CO2	<i>Explain</i> the process of listening and speaking						Cognitive	Understanding				
CO3	<i>Adapt</i> important methods of reading						Cognitive	Creating				
CO4	<i>Demonstrate</i> the basic writing skills						Cognitive	Understanding				
<b>SYLLABUS</b>								<b>HOURS</b>				
<b>UNIT I</b>	<b>Grammar</b>											
i. Major basic grammatical categories ii. Notion of correctness and attitude to error correction						9						
<b>UNIT II</b>	<b>Listening and Speaking</b>											
iii. Importance of listening skills iv. Problems of listening to unfamiliar dialects v. Aspects of pronunciation and fluency in speaking vi. Intelligibility in speaking						9						
<b>UNIT III</b>	<b>Basics of Reading</b>											
vii. Introduction to reading skills viii. Introducing different types of texts – narrative, descriptive, extrapolative						9						
<b>UNIT IV</b>	<b>Basics of Writing</b>											
ix. Introduction to writing skills x. Aspects of cohesion and coherence xi. Expanding a given sentence without affecting the structure xii. Reorganizing jumbled sentences into a coherent paragraph xiii. Drafting different types of letters (personal notes, notices, complaints, appreciation, conveying sympathies etc.)						9						
<b>LECTURE</b>		<b>TUTORIAL</b>		<b>PRACTICAL</b>		<b>SELF STUDY</b>		<b>TOTAL</b>				
<b>30</b>		<b>0</b>		<b>0</b>		<b>30</b>		<b>60</b>				
<b>Text books</b>												



1. Acevedo and Gower M (1999) Reading and Writing Skills. London, Longman
2. Deuter, M et.al. (2015). Oxford Advanced Learner's Dictionary of English (Ninth Edition). New Delhi, OUP
3. Eastwood, John (2008). Oxford Practice Grammar. Oxford, OUP
4. Hadeffield, Chris and J Hadeffield (2008). Reading Games. London, Longman
5. Hedge, T (2005). Writing. Oxford, OUP
6. Jolly, David (1984). Writing Tasks: Students' Book. Cambridge, CUP
7. Klippel and Swan (1984). Keep Talking. Oxford, OUP
8. Saraswati, V (2005). Organized Writing 1. Hyderabad, Orient Blackswan
9. Swan, Michael. (1980). Practical English Usage. Oxford, OUP
10. Walter and Swan (1997). How English Works. Oxford, OUP

**Table 1: Mapping of Cos with POs:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	2	0	0	0	0	0	2	0	1	0	0	0	0	0
<b>CO2</b>	2	0	0	0	0	0	2	0	1	0	0	0	0	0
<b>CO3</b>	1	0	0	0	0	0	1	0	1	0	0	0	0	0
<b>CO4</b>	2	0	0	0	0	0	1	0	1	0	0	0	0	0
<b>Total</b>	7	0	0	0	0	0	6	0	4	0	0	0	0	0
<b>Scale Value</b>	2	0	0	0	0	0	2	0	1	0	0	0	0	0
	1	0	0	0	0	0	1	0	1	0	0	0	0	0

1-5= 1, 6-10 = 2, 11-15= 3

0-No Relation, 1- Low Relation, 2 – Medium Relation, 3- High Relation

**Table 2: Mapping of COs with GAs:**

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12

CO1	0	0	0	0	0	0	0	1	1	2	0	0
CO2	0	0	0	0	0	0	0	0	0	2	0	0
CO3	0	0	0	0	0	0	0	0	0	1	0	0
CO4	0	0	0	0	0	0	0	0	0	0	1	0
<b>Total</b>	0	0	0	0	0	0	0	1	1	5	2	0
<b>Scale</b>	0	0	0	0	0	0	0	1	1	1	1	0

1-5= 1, 6-10 = 2, 11-15= 3

0-No Relation, 1- Low Relation, 2 – Medium Relation, 3- High Relation

### Performance Indicators

#### PI 8: 1 High Ethical Standards

1.1.1 Practice ethical codes and standards endorsed by professional engineers.

#### PI 9: 1 Leadership and team work

1.1.1 Perform as an individual and as a leader in diverse teams and in multi-disciplinary scenarios.

#### PI 10: 1 Communication Skills

1.1.1 Professional communication with the society to comprehend and formulate reports, documentation, effective delivery of presentation and responsible to clear instructions.

#### PI 11: 1. Life-long learners:

1.1.1 Update the technical needs in a challenging world in equipping themselves to maintain their competence

XGL102 A			mwptpay;jkpo				L	T	P	C
							3	0	0	3
C	P	A					L	T	P	H
2.9	0.1	0					3	0	0	3
<b>PREREQUISITE:</b> Nil										
<b>COURSE OUTCOMES</b>							<b>DOMAIN</b>		<b>LEVEL</b>	
After the completion of the course, students will be able to										
CO1	<i>Recognize(milahsk; fhZjy;)gy;NtWmwptpay; Jiwruh;e;jEl;gq;fs;&gt;fiyr; nrhy;yhf;fcj;jpfs; Nghd;wtw;iwj; jkpo;nkhop %yk; mwpe;Jnfhs;sy;.</i>					Cognitive		Remember		

<b>CO2</b>	<b>Choose</b> ( <i>njupTnra;jy;</i> )tlmkhopNtu;r;nrhw;fs;>Gtpapay;>epytpay; gw;wpg; goe;jkpo; ,yf;fpaq;fs; %yk; mwpe;Jnfhs;sy;.	Cognitive	Remember
<b>CO3</b>	<b>Describe</b> ( <i>tpsf;Fjy;</i> )njhy;fhg;gpak; %yk; mwptpay; nra;jpfisczu;jy;.	Cognitive Psychomotor	Understand Set
<b>CO4</b>	<b>Apply</b> ( <i>gad;gLj;Jjy;</i> )gy;NtWfy;tpj;Jiwrhu;e;jgpupTfs;>gy;NtWfy;tpj;Ji wrhu;e;jgpupTfs; Fwpj;JnjspTngwy;.	Cognitive	Apply
<b>CO5</b>	<b>Analyze</b> ( <i>gFj;jy;</i> )mwptpay; rpWfijfspd; Njhw;wk; kw;Wk; tsu;r;rpepiyehlfq;fspd; gq;FFwpj;JnjspTngWjy;.	Cognitive	Analyze
<b>myF- 1</b>	<b>mwptpay;jkpo; mwpKfk;</b>		<b>9</b>
mwptpay;jkpo; - nghwpapay;>njhopy;El;gk;>kUj;Jtk;>cotpay;. jkpopy; mwptpay; - jkpopy; El;gk;. gilg;Gg; gzp-nrhy;yhf;fcj;jpfs; - El;gkhdNtWghLfisczu;e;Jnrhy;yhf;fk; nra;jy; - fiyr;nrhw;fs; - ,e;jpankhofSf;Fg; nghJthdfiyr; nrhw;fiscUthf;Fjy; - tlmkhopNtu;r;nrhw;fiskpFjpahff; nfhz;bUj;jiyg; gad;gLj;Jjy;.			
<b>myF- 2</b>	<b>gpwmwptpay; Jiwfs;</b>		<b>9</b>
Gtpapay;>epytpay; gw;wpgoe;jkpo; ,yf;fpak; Fwpg;gpLk; jfty;fs; - njhy;fhg;gpak; Fwpg;gpLk; capupay;>kz;zpays; gw;wpambg;gilr; nra;jpfs; - jkpo; kUj;Jtf; fy;tp - mwptpay; jkpOf;F ,jopay; cj;jpfs; - tsu; jkpo;.			
<b>myF- 3</b>	<b>gy;NtWfifyfs; mwptpay;</b>		<b>9</b>
nkhopapay; fy;tp-fl;llf; fiyf;fy;tp-rKjhaf;fy;tp-Nra;ikf;fy;tp-kz;zpays;>Gtpapay;>fzf;fpay; Mfpait,ize;jfy;tp - ,f;fhyf; fy;tpg; nghJepiy-fiy>mwptpay; - vd;gtw;wpd; tpsf;fq;fs;.			
<b>myF- 4</b>	<b>mwptpay; jkpopy; rpWfijfspd; gq;F</b>		<b>9</b>
rpWfij -,yf;fzk; cUthf;Fk; cj;jpfs; - rpwe;jrpWfijfs; - rpWfij tiffs; - ey;yrpWfijcUthf;fk; - tuyhW-r%fk; - nkhopngau;g;Gkw;Wk; mwptpay; rpWfijfs;.			
<b>myF-5</b>	<b>mwptpay; jkpopy; ehlfq;fspd; gq;F</b>		<b>9</b>
ehlfk; - ehlf ,yf;fzk;> ,Utifehlfq;fs; - gbg;gjw;Fupaehlfk; - ebg;gjw;Fupaehlfk; - rupj;jpuehlfk;>r%fehlfk; - eifr;Ritehlfq;fs; - mnkr;#u; ehlfq;fs; - njhopy;Kiwehlfq;fs;.			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>45</b>	<b>---</b>	<b>---</b>	<b>45</b>
<b>Nkw;ghu;itEhy;fs;:</b>			
1. mwptpay; jkpo; - lhf;lu; th.nr. Foe;ijr;rhkp			
2. tsu; jkpo; - ,jo;fs;			

3. .yf;fpatuyhW-rpWfijgw;wpaJ

4. .yf;fpatuyhW-Gjpdk;gw;wpaJ

**Table 1: CO Versus PO mapping.**

B.Sc. A & M	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1		1							
CO2		1							
CO3		1					1		
CO4	1	2	2	1		1	2		
CO5	2	2	2	2		1	2		
<b>Total</b>	3	7	4	3		2	5		
<b>Scaled Value</b>	1	1	1	1			1		

1 – 5 -> 1    6 – 10 ->2    11 – 15 -> 3

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

1.9 XBC103			PROGRAMMING METHODOLOGIES	L	T	P	SS	C
				3	1	1	1	6
C	P	A		L	T	P	SS	H
2.5	1	0.5		3	1	3	1	8
COURSE OUTCOMES				DOMAIN	LEVEL			
CO1	<i>Recognize</i> the importance of developing simple algorithms and flow charts to solve a problem.			Cognitive	Remember			

		Psychomotor	Perception
<b>CO2</b>	<i>Identify</i> the needs problem solving skills coupled with top down design principles.	Cognitive Psychomotor	Understand Perception
<b>CO3</b>	<i>Demonstrate</i> the strategies of array processing algorithms coupled with iterative methods.	Cognitive Psychomotor Affective	Apply Perception Receive
<b>CO4</b>	<i>Illustrate</i> the concept of Structures application development.	Cognitive Psychomotor Affective	Apply Mechanism Respond
<b>CO5</b>	<i>Develop</i> and <i>Establish</i> searching techniques and use of pointers. recursive techniques in programming	Cognitive Psychomotor	Create Origination
<b>UNIT I</b>	<b>INTRODUCTION TO PROGRAMMING</b>		<b>9+3+9</b>
<p>Introduction to Programming, Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies, Introduction to C++ Programming - Basic Program Structure In C++, Variables and Assignments, Input and Output, Selection and Repetition Statements.</p> <p><b>Lab:</b></p> <p>Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following:</p> <ol style="list-style-type: none"> <li>To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures.</li> </ol>			
<b>UNIT II</b>	<b>FUNCTIONS</b>		<b>9+3+9</b>
<p>Top-Down Design, Predefined Functions, Programmer -defined Function, Local Variable, Function Overloading, Functions with Default Arguments, Call -By-Value and Call-By-Reference Parameters, Recursion.</p> <p><b>Lab:</b></p>			

**Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments on following :**

- b. Learn how to use functions and parameter passing in functions, writing recursive programs.

<b>UNIT III</b>	<b>ARRAYS</b>	<b>9+3+9</b>
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Introduction to Arrays, Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays. Arrays in Functions, Multi-Dimensional Arrays.

**Lab:**

**Write Programs to learn the use of strings and string handling operations.**

1. Problems which can effectively demonstrate use of Arrays. Structures and Union.

<b>UNIT IV</b>	<b>STRUCTURES</b>	<b>9+3+9</b>
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Structures - Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures, Unions

**Lab :**

1. Write programs using pointers

<b>UNIT V</b>	<b>FILES AND SEARCHING ALGORITHMS</b>	<b>9+3+9</b>
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Declaration and Initialization, Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions. Searching Algorithms - Linear Search, Binary Search. Use of files for data input and output. merging and copy files.

**Lab:**

1. Write programs to use files for data input and output.

2. Write programs to implement search algorithms.

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>
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<b>45</b>	<b>15</b>	<b>45</b>	<b>15</b>	<b>105+15</b>
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**TEXT BOOKS**

1. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015.
2. Programming and problem solving with C++: brief edition, N. Dale and C. Weems, Jones & Bartlett Learning, 2010.

**REFERENCES**

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. (2005).
2. Aho A.V. J.E. Hopcroft and J.D. Ullman., 2001. "The Design and Analysis of Computer Algorithms", Pearson Education Delhi. Second Edition.

**E-REFERENCES**

<http://www.comptechdoc.org/basic/basicut/index.html>  
<http://cse02-iiith.vlabs.ac.in/>  
<http://textofvideo.nptel.iitm.ac.in/video.php?courseId=106104128>  
<http://www.nptel.ac.in>  
<http://www.vlab.co.in>

**Table 1: Mapping of Cos with POs.**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	2	2	2				2	1
CO2	1			2				2	
CO3	1		2	1					
CO4	2	1	2	3				2	1
CO5	2		1	3				2	
<b>Total</b>	8	3	7	11				8	2
<b>Scaled Value</b>	2	1	2	3				2	1

1 -- 5 → 1,      6 -- 10 → 2,      11--15 → 3

0–No relation   1–Low relation   2–Medium relation   3–Strong relation

<b>XBC104</b>	<b>ALGEBRA, CALCULUS AND ANALYTICAL GEOMETRY</b>	L	T	P	S	C
		4	1	0	1	6

C	P	A	L	T	P	S	S	H
4	0	0	4	1	0	1		6
<b>PREREQUISITES</b>			Basics of Mathematics					
<b>COURSE OUTCOMES</b>			<b>DOMAIN</b>		<b>LEVEL</b>			
<b>CO1</b>	Evaluate the derivatives of given functions		Cognitive		Understand			
<b>CO2</b>	Calculate the definite and indefinite integrals using various techniques.		Cognitive		Understand, Remember			
<b>CO3</b>	Apply basic operations on matrices to find the inverse of a matrix		Cognitive		Understand, Apply			
<b>CO4</b>	Solve problems using Binomial, exponential and logarithmic series expansions.		Cognitive		Understand			
<b>CO5</b>	Calculate the distance between two points and explain section formulae, slope form and intercept form.		Cognitive		Understand			
<b>UNIT I – DIFFERENTIAL CALCULUS</b>			<b>12+3</b>					
Derivative of a function – Various formulae – Product and quotient rule of differentiation – Differentiation of function of function (chain rule) – Trigonometric functions – Inverse trigonometric functions – Exponential function – Logarithmic functions – Logarithmic differentiation - Higher derivatives – Successive differentiation – Leibnitz theorem.								
<b>UNIT II – INTEGRAL CALCULUS</b>			<b>12+3</b>					
Constant of integration – Indefinite integral – Elementary integral formulae – Methods of integration – Integration by substitution - Integration by parts – Integration through partial fractions – Concept of definite integral – Properties of definite integral.								
<b>UNIT III – MATRICES AND DETERMINANTS</b>			<b>12+3</b>					
Definition and types of matrices – Matrix Operation – Determinants – Solution of system of linear equations by Matrix method.								
<b>UNIT IV – SERIES</b>			<b>12+3</b>					
Binomial theorem for a rational index – Exponential and Logarithmic series – Summation of the above series.								
<b>UNIT V – TWO-DIMENSIONAL ANALYTICAL GEOMETRY</b>			<b>12+3</b>					



Cartesian coordinate system – Introduction to polar coordinates – Distance between two points – Section formulae – Area of triangle – Locus and its equations – Straight line: Equation of a straight line parallel to an axis – slope form –normal form – Intercept form through two point –condition of concurrency of three lines.

LECTURE	TUTORIAL	SELF STUDY	PRACTICAL	TOTAL
60	15	15	0	75+15

#### TEXT BOOKS

1. T. K. ManicavachagomPillay, T. Natarajan, K. S. Ganapathy, Algebra, Volume I , S.Vishvanathan Printers and Publishers Pvt., Ltd, Chennai 2004.
2. S.Narayanan, T.K.ManicavachagamPillay, S.Vishvanathan, Calculus volume I & IIPrinters and Publishers Pvt., Ltd, Chennai 1991.

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1. P.Kandasamy&K.Thilagavathi, B.Sc Mathematics for branch I – Vol I &Vol II, S.Chand& Co, 2004.

#### E- REFERENCES

[www.nptel.ac.in](http://www.nptel.ac.in)

Advanced Engineering Mathematics, Prof. PratimaPanigrahi, Department of Mathematics, Indian Institute of Technology, Kharagpur.

#### Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3						2		
CO2	3						2		
CO3	3						2		
CO4	3						2		
CO5	3						2		
Total	15						10		
Scaled Value	3						2		

1-5→1, 6-10→2, 11-15→3

0 – No Relation, 1 – Low Relation, 2- Medium Relation, 3- High Relation

<b>COURSE CODE</b>	<b>XBC105</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>COURSE NAME</b>	<b>COMPUTER FUNDAMENTALS</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>6</b>
<b>PREREQUISITES</b>	<b>Nil</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>C:P:A</b>	<b>3:1:0</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>8</b>
<b>COURSE OUTCOME</b>		<b>Domain</b>		<b>Level</b>		
CO1	<i>Recognize</i> the importance of computer system, application and practice in Libre Office (FOSS) Writer.	Cognitive Psychomotor		Understand Origination		
CO2	<i>Identify</i> and <i>define</i> basic terms and concepts in computer hardware and peripheral devices and Libre Office (FOSS) Impress.	Cognitive Psychomotor		Understand Origination		
CO3	<i>Establish</i> the relationship between hardware and software. <i>Arrange</i> data and Apply formula in Libre Office (FOSS) Calc.	Cognitive Psychomotor		Apply Origination		
CO4	<i>Identify</i> the IO devices. <i>Design</i> database using Libre Office (FOSS) Base.	Cognitive Psychomotor		Remembrance Origination		
CO5	<i>Identify</i> flowchart component and <i>apply</i> in program and design a project using Libre Office (FOSS).	Cognitive Psychomotor		Understand Apply Origination		

<b>UNIT I - INTRODUCTION</b>	<b>9+3+9</b>
<p>Introduction – Characteristics of computer – Evolution of computer- Generation of computer – classification of computer- The Computer system –Applications of computers</p> <p><b>Lab:</b></p> <p>Libre Office Writer</p> <p>Text Processing Table Creation Resume Creation Mail Merge</p>	
<b>UNIT II - COMPUTER ARCHITECTURE</b>	<b>9+3+9</b>
<p>The Central processing unit (CPU) – Main Memory Unit – Interconnection Unit – Cache – Communication between various units of a computer system.</p> <p><b>Lab :</b></p> <p>Libre Office Calc</p> <p>Worksheet Creation Employee Pay Details Student Result Sheet Simple Charts</p>	
<b>UNIT III - PRIMARY AND SECONDARY MEMORY</b>	<b>9+3+9</b>
<p><b>Primary memory :</b> Memory representation – memory hierarchy - Random access memory – Types of Memory – Read only memory – types of ROM – <b>Secondary Memory</b> – Classification of secondary storage devices –Magnetic tape – Magnetic disk - Optical disk – Memory stick - Universal serial bus – Mass storage devices</p> <p><b>Lab :</b></p> <p>Libre Office Impress</p> <p>Power Point Preparation Create Text And Images With Effects Create Animation And Sound Effects</p>	

<b>UNIT IV - INPUT AND OUT PUT DEVICES</b>	<b>9+3+9</b>
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**Input devices** Types of input devices - Optical character recognition – Optical Mark recognition - Magnetic ink character recognition – Bar code reader – **Output devices** : Types of output - Classification of output devices - Terminals

**Lab :**

Libre Office Access

Importing Data From Data Base

Creating Macro

Result Processing

<b>UNIT V</b>	<b>COMPUTER PROGRAM AND LANGUAGES</b>	<b>9+3+9</b>
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**Computer Program** : Developing a program - Algorithm – flow chart - decision table – program testing and debugging- Program documentation – Programming paradigms - Characteristics of good program – **Computer languages** : Evolution of programming language – Classification of programming Language – Generation of a programming language – features of a good programming language

**Lab :**

Libre Office Project

Creating A Greeting Card

Creating A Cover Page Of A Project

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>Self-Study</b>	<b>TOTAL</b>
<b>45</b>	<b>15</b>	<b>45</b>	<b>15</b>	<b>105+15</b>

**Text books**

Dorling Kindersley, 2009. Introduction to Computer Science IITL Education Solutions Limited fourth Edition.

**References:**

1. Roger Hunt and John Shelly, penguin Edition,2007. Computers and common sense, (PHI)
2. Internet for everyone, Lenon&Lenon (Lenon Tech World), 2009.

**E-References:**

3. <http://www.nptel.ac.in>

4. <http://www.vlab.co.in>

### Mapping of COs with POs

Course Outcomes	Program Outcomes								
	1	2	3	4	5	6	7	PSO1	PSO2
CO1	2	1	1	1					
CO2			1	1					
CO3	1	2	1	1	1				
CO4	1	2	1	1	1				
CO5	1	1	1	1	2	2		1	
<b>Total</b>	<b>5</b>	<b>6</b>	<b>5</b>	<b>5</b>	<b>4</b>	<b>3</b>		<b>1</b>	
<b>Scaled Value</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>		<b>1</b>	

1-5 → 1, 6-10 → 2, 11-15 → 3

0 – No relation, 1 – Low relation, 2 – Medium relation, 3 – High relation

<b>COURSE CODE</b>	<b>XUM106</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>COURSE NAME</b>	<b>HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>
<b>PREREQUISITES</b>	<b>-</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>C:P:A</b>	<b>1.5:0:0.5</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>3</b>
<b>COURSE OUTCOMES</b>		<b>Domain</b>		<b>Level</b>		
<b>CO1</b>	<i>Relate</i> and <i>Interpret</i> the human ethics and human relationships	Cognitive		Remember		
<b>CO2</b>	<i>Explain</i> and <i>Apply</i> gender issues, equality and violence against women	Cognitive		Understanding, Applying		

<b>CO3</b>	<i>Classify</i> and <i>Develop</i> the identify of human rights and their violations	Cognitive Affective	Analyzing Receiving	
<b>CO4</b>	<i>Classify</i> and <i>Dissect</i> necessity of human rights and report on violations.	Cognitive	Understanding, Analyze	
<b>CO5</b>	<i>List</i> and <b>respond</b> to family values, universal brotherhood, fight against corruption by common man and good governance.	Cognitive Affective	Remember, Respond	
<b>UNIT I HUMAN ETHICS AND VALUES</b>			<b>6+3</b>	
Human Ethics and values - Understanding of oneself and others- motives and needs- Social service, Social Justice, Dignity and worth, Harmony in human relationship: Family and Society, Integrity and Competence, Caring and Sharing, Honesty and Courage, WHO's holistic development - Valuing Time, Co-operation, Commitment, Sympathy and Empathy, Self-respect, Self-Confidence, character building and Personality.				
<b>UNIT II GENDER EQUALITY</b>			<b>6+3</b>	
Gender Equality - Gender Vs Sex, Concepts, definition, Gender equity, equality, and empowerment. Status of Women in India Social, Economic, Education, Health, Employment, HDI, GDI, GEM. Contributions of Dr.B.R. Ambedkar, Thanthai Periyar and Phule to Women Empowerment.				
<b>UNIT III WOMEN ISSUES AND CHALLENGES</b>			<b>6+3</b>	
Women Issues and Challenges- Female Infanticide, Female feticide, Violence against women, Domestic violence, Sexual Harassment, Trafficking, Access to education, Marriage. Remedial Measures – Acts related to women: Political Right, Property Rights, and Rights to Education, Medical Termination of Pregnancy Act, and Dowry Prohibition Act.				
<b>UNIT IV HUMAN RIGHTS</b>			<b>6+3</b>	
Human Rights Movement in India – The preamble to the Constitution of India, Human Rights and Duties, Universal Declaration of Human Rights (UDHR), Civil, Political, Economic, Social and Cultural Rights, Rights against torture, Discrimination and forced Labor, Rights and protection of children and elderly. National Human Rights Commission and other statutory Commissions, Creation of Human Rights Literacy and Awareness. - Intellectual Property Rights (IPR). National Policy on occupational safety, occupational health and working environment.				
<b>UNIT V GOOD GOVERNANCE AND ADDRESSING SOCIAL ISSUES</b>			<b>6+3</b>	
Good Governance - Democracy, People's Participation, Transparency in governance and audit, Corruption, Impact of corruption on society, whom to make corruption complaints, fight against corruption and related issues, Fairness in criminal justice administration, Government system of Redressal. Creation of People friendly environment and universal brotherhood.				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>SELF STUDY</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
<b>30</b>	<b>0</b>	<b>15</b>	<b>0</b>	<b>45</b>
<b>Textbook</b>				

1. Aftab A, (Ed.), Human Rights in India: Issues and Challenges, (New Delhi: Raj Publications, 2012).
2. Mani. V. S., Human Rights in India: An Overview (New Delhi: Institute for the World Congress on Human Rights, 1998).
3. Singh, B. P. Sehgal, (ed) Human Rights in India: Problems and Perspectives (New Delhi: Deep and Deep, 1999).
4. Veeramani, K. (ed) Periyar on Women Right, (Chennai: Emerald Publishers, 1996)
5. Veeramani, K. (ed) Periyar Feminism, (PeriyarManiammai University, Vallam, Thanjavur: 2010).

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1. Bajwa, G.S. and Bajwa, D.K. Human Rights in India: Implementation and Violations (New Delhi: D.K. Publications, 1996).
2. Chatrath, K. J. S., (ed.), Education for Human Rights and Democracy (Shimala: Indian Institute of Advanced Studies, 1998).
3. Jagadeesan. P. Marriage and Social legislations in Tamil Nadu, Chennai: Elachiapen Publications, 1990).
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#### E-Reference

1. [http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg\\_occup\\_safety.p](http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_occup_safety.p)
2. <http://cvc.nic.in/welcome.html>.
3. <https://www.transparency.org/>
4. <https://www.hrw.org/world-report/2015/country-chapters/india>

#### Mapping of COs with Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
<b>CO1</b>					2	2	1			
<b>CO2</b>					2	2				
<b>CO3</b>						2				
<b>CO4</b>						2	1			
<b>CO5</b>						3				
<b>Total</b>					4	11	2			
Scaled Value					1	2	1			

1 – 5 → 1, 6-10 → 2, 11 – 15 → 3

0 – No relation, 1 – Low relation, 2 – Medium relation, 3 – High relation

1.10 XGL2 01			ADVANCED ENGLISH COMMUNICATION SKILLS		L	T	P	SS	C
					2	0	0	0	2
C	P	A			L	T	P	SS	H
1.5	0	0.5			2	0	0	2	4
PREREQUISITE: Nil									
COURSE OUTCOMES					DOMAIN			LEVEL	
On the successful completion of this course students would be able to									
CO1	<i>Recall</i> the basic grammar and using it in proper context				Cognitive			Remembering	
CO2	<i>Explain</i> the process of listening and speaking				Cognitive			Understanding	
CO3	<i>Adapt</i> important methods of reading				Cognitive			Creating	
CO4	<i>Demonstrate</i> the basic writing skills				Cognitive			Understanding	
UNIT I		Advanced Reading						6	
i. Reading texts of different genres and of varying length ii. Different strategies of comprehension iii. Reading and interpreting non-linguistic texts iv. Reading and understanding incomplete texts (Cloze of varying lengths and gaps; distorted texts.)									
UNIT II		Advanced Writing						6	
v. Analysing a topic for an essay or a report vi. Editing the drafts arrived at and preparing the final draft vii. Re-draft a piece of text with a different perspective (Manipulation exercise) viii. Summarise a piece of prose or poetry ix. Using phrases, idioms and punctuation appropriately									
UNIT III		Principles of communication and communicative competence						6	
x. Introduction to communication – principles and process xi. Types of communication – verbal and non-verbal xii. Identifying and overcoming problems of communication xiii. Communicative competence									
UNIT IV		Cross Cultural Communication						6	
xiv. Cross-cultural communication									



LECTURE	TUTORIAL	SELF STUDY	PRACTICAL	TOTAL
30	0	30	0	60

**REFERENCES:**

- 1) Bailey, Stephen (2003). Academic Writing. London and New York, Routledge.
- 2) Department of English, Delhi University (2006). Fluency in English Part II. New Delhi, OUP
- 3) Grellet, F (1981). Developing Reading Skills: A Practical Guide to Reading Skills. New York, CUP
- 4) Hedge, T. (2005). Writing. London, OUP
- 5) Kumar, S and Pushp Lata (2015). Communication Skills. New Delhi, OUP
- 6) Lazar, G. (2010). Literature and Language Teaching. Cambridge, CUP
- 7) Nuttall, C (1996). Teaching Reading Skills in a Foreign Language. London, Macmillan
- 8) Raman, Meenakshi and Sangeeta Sharma (2011). Technical Communication: Principles and Practice. New Delhi, OUP

1.11 XES202			ENVIRONMENTAL STUDIES	L	T	P	SS	C
				0	0	0	0	0
1.12	P	A		L	T	P	SS	H
1.13	0	0.5		2	0	0	1	3

**PREREQUISITE :** Nil

Course Outcomes	Domain	Level
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After the completion of the course, students will be able to

CO1	<i>Describe</i> the significance of natural resources and <i>explain</i> anthropogenic impacts.	Cognitive	Remember Understand
CO2	<i>Illustrate</i> the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.	Cognitive	Understand
CO3	<i>Identify</i> the facts, consequences, preventive measures of major pollutions and <i>recognize</i> the disaster phenomenon	Cognitive Affective	Remember Receiving

CO4	<i>Explain</i> the socio-economic, policy dynamics and <i>practice</i> the control measures of global issues for sustainable development.	Cognitive	Understand
CO5	the impact of population and the concept of various welfare programs, and <i>apply</i> the modern technology towards environmental protection.	Cognitive	Understand Apply
<b>UNIT I</b>	<b>INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY</b>		<b>6</b>
<p>Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, flood, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.</p>			
<b>UNIT II</b>	<b>ECOSYSTEMS AND BIODIVERSITY</b>		<b>6</b>
<p>Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.</p>			
<b>UNIT III</b>	<b>ENVIRONMENTAL POLLUTION</b>		<b>6</b>
<p>Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid waste management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: flood, earthquake, cyclone and landslide.</p>			
<b>UNIT IV</b>	<b>SOCIAL ISSUES AND THE ENVIRONMENT</b>		<b>6</b>
<p>Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.</p>			

<b>UNIT V</b>	<b>HUMAN POPULATION AND THE ENVIRONMENT</b>	<b>6</b>
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Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education - HIV / AIDS – Women and Child welfare programme– Role of Information Technology in Environment and human health – Case studies.

<b>Lecture</b>	<b>Tutorial</b>	<b>Self-Study</b>	<b>Practical</b>	<b>Total</b>
<b>30</b>	<b>0</b>	<b>15</b>	<b>0</b>	<b>45</b>

#### **Text book**

1. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, 2000.
2. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, 2003

#### **Reference Books**

1. Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, 2003.
2. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, 2006.
3. Introduction to International disaster management, Butterworth Heinemann, 2006.
4. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, 2004.
5. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, 2009.
6. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
7. S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, 2012.
8. Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, 2003.
9. Sundar, Disaster Management, Sarup& Sons, New Delhi, 2007.
10. G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, 2006.

#### **E-references**

1. <http://www.e-booksdirectory.com/details.php?ebook=10526>
2. <https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science>
3. <https://www.free-ebooks.net/ebook/What-is-Biodiversity>
4. [https://www.learner.org/courses/envsci/unit/unit\\_vis.php?unit=4](https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4)
5. <http://bookboon.com/en/pollution-prevention-and-control-ebook>
6. <http://www.e-booksdirectory.com/details.php?ebook=8557>
7. <http://www.e-booksdirectory.com/details.php?ebook=6804>

	<b>GA1</b>	<b>GA2</b>	<b>GA3</b>	<b>GA4</b>	<b>GA5</b>	<b>GA6</b>	<b>GA7</b>	<b>GA8</b>	<b>GA9</b>	<b>GA10</b>
<b>CO1</b>	2						2		2	2
<b>CO2</b>	1						2			2

CO3	2	1	2				3		2	3
CO4	2	2	2				2			3
CO5	2				3	3				2
	9	3	4		3	3	9		4	12
Scaled value	2	1	1		1	1	2		1	3

XBC203			DATA STRUCTURES					L	T	P	SS	C
								3	1	1	1	6
C	P	A						L	T	P	SS	H
3	1	0						3	1	3	1	7
<b>PREREQUISITE:</b> Computer Programming												
<b>Course Outcomes</b>							<b>Domain</b>		<b>Level</b>			
After the completion of the course, students will be able to												
CO1	<i>Explains</i> the concept of data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles						Cognitive Psychomotor		Understand Apply			
CO2	<i>Choose</i> To have a knowledge of complexity of basic operations like insert, delete, search on these data structures						Cognitive		Remember			
CO3	Ability to choose a data structure to suitably model any data used in computer applications						Cognitive Psychomotor		Apply Set			
CO4	Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc.						Cognitive		Analyze			

<b>CO5</b>	Ability to assess efficiency tradeoffs among different data structure implementations. Implement and know the applications of algorithms for sorting, pattern matching etc.	Cognitive	Create
<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9+3+ 9</b>	
<p>Basic concepts- Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction Performance analysis, Linear and Non-Linear data structures, Singly Linked Lists-Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists-Operations. Representation of single, two dimensional arrays, sparse matrices-array and linked representations.</p> <p><b>Lab</b></p> <p>Write program that uses functions to perform the following:</p> <p>a) Creation of list of elements where the size of the list, elements to be inserted and deleted are dynamically given as input.</p> <p>b) Implement the operations, insertion, deletion at a given position in the list and search for an element in the list</p> <p>c) To display the elements in forward / reverse order</p>			
<b>UNIT II</b>	<b>LINEAR DATA STRUCTURES</b>	<b>9+3+ 9</b>	
<p>Stack- Operations, Array and Linked Implementations, Applications- Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation, Queue- Definition and Operations, Array and Linked Implementations, Circular Queues - Insertion and Deletion Operations, Dequeue (Double Ended Queue).</p> <p><b>Lab</b></p> <ol style="list-style-type: none"> <li>1. Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion)</li> <li>2. Write a program to implement queue data structure and basic operations on it (Insertion, deletion, find length) and code at least one application using queues</li> </ol>			
<b>UNIT III</b>	<b>TREES</b>	<b>9+3+ 9</b>	
<p>Trees, Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees, Priority Queue- Implementation, Heap- Definition, Insertion, Deletion.</p> <p><b>Lab</b></p> <ol style="list-style-type: none"> <li>1. Write a program that uses well defined functions to Create a binary tree of elements and Traverse a Binary tree in preorder, inorder and postorder.</li> </ol>			
<b>UNIT IV</b>	<b>GRAPHS</b>	<b>9+3+ 9</b>	

Graphs, Graph ADT, Graph Representations, Graph Traversals, Searching, Static

Hashing- Introduction, Hash tables, Hash functions, Overflow Handling. Sorting Methods, Comparison of Sorting Methods.

**Lab**

1. Write program that implements linear and binary search methods of searching for an element in a list.
2. Write and trace programs to understand the various phases of sorting elements using the methods.

a) Insertion Sort

b) Quicksort

c) Bubble sort

<b>UNIT V</b>	<b>ALGORITHM DESIGN TECHNIQUES</b>	<b>9+3+ 9</b>
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Search Trees- Binary Search Trees, AVL Trees- Definition and Examples.Red-Black and Splay Trees, Comparison of Search Trees, Pattern Matching,Algorithm- The Knuth-Morris-Pratt Algorithm, Tries (examples).

**Lab**

1. Write and trace programs to Create a Binary search tree and insert and delete from the tree.
2. Represent suitably a graph data structure and demonstrate operations of traversals on it.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
<b>45</b>	<b>15</b>	<b>45</b>	<b>15</b>	<b>105+15</b>

**REFERENCES:**

1. Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.
2. Data structures and Algorithm Analysis in C, 2nd edition, M. A. Weiss, Pearson
3. Lipschutz: Schaum’s outline series Data structures Tata McGraw-Hill
  1. [www.tutorialspoint.com](http://www.tutorialspoint.com)
  2. [www.nptel.com](http://www.nptel.com)
  3. [www.virtuallab.ac.in](http://www.virtuallab.ac.in)
  4. Lecture Slides, Multiple Choice Questions, Animations Link: [http://highered.mheducation.com/sites/0072967757/student\\_view0/index.html](http://highered.mheducation.com/sites/0072967757/student_view0/index.html)
  5. Lecture Slides : <http://www.mhhe.com/engcs/compsci/forouzan/>

<b>COURSE CODE</b>	<b>XBC204</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
COURSE NAME	<b>DISCRETE MATHEMATICS</b>	3	1	0	2	6

PREREQUISITE		NIL	L	T	P	SS	H
C:P:A		3:0:0	3	1	0	2	6
<b>Course Outcome</b>			<b>Domain</b>		<b>Level</b>		
<b>CO1</b>	<i>Define</i> the properties and laws of sets, relations and functions and <i>Apply</i> the operation of the sets using Venn Diagram.		<b>Cognitive</b>		R, Ap		
<b>CO2</b>	<i>Apply</i> the concepts of logic and to find the normal forms. <i>Explain</i> the tautologies and Contradiction.		<b>Cognitive</b>		U, Ap		
<b>CO3</b>	<i>Apply</i> the counting principle permutation and combination and to <i>solve</i> the problem. <i>Explain</i> the pigeonhole principle.		<b>Cognitive</b>		U, Ap		
<b>CO4</b>	<i>Explain</i> the types of lattices and to <i>show</i> lattices as partially ordered sets.		<b>Cognitive</b>		U, Ap		
<b>CO5</b>	<i>Apply</i> the properties of semi groups and groups and Explain any set with binary operation as a semigroup and group with examples.		<b>Cognitive</b>		U, Ap		
<b>UNIT I</b>						<b>12</b>	
Set notations – Basic definitions and set operations – Venn diagram – Algebraic laws of set theory – D Morgan’s law. Relations: Properties of relations – Types of relations – Equivalence classes. Functions: Definition – Domain – Range and types of function- Classification of function.							
<b>UNIT II</b>						<b>12</b>	
Statements - Normal forms – CNF – DNF – PCNF - PDN – Tautologies - Contradictions.							
<b>UNIT III</b>						<b>12</b>	
Counting principles – The Pigeonhole principle – Counting – Permutations and Combinations – Combinatorial arguments – Countable and uncountable sets.							
<b>UNIT IV</b>						<b>12</b>	
Lattices as partially ordered set – Types of lattices – Lattices as algebraic system.							
<b>UNIT V</b>						<b>12</b>	

Binary operations – Semi groups - Groups – Examples and elementary properties.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	15	0	30	60 + 30

**TEXT BOOK**

1. Ralph. P. Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, Fourth Edition, Pearson Education Asia, Delhi, 2002.
2. Kenneth Levasseur and Alan Doerr, “Applied Discrete Structures, Department of Mathematical Sciences, University of Massachusetts Lowell, Version 2.0, 2013.

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1. Kenneth H.Rosen, “Discrete Mathematics and its Application”, Fifth edition, Tata McGraw-Hill Publishing company pvt.Ltd., New Delhi, 2003.
2. Dr.M.K.Venkataraman, Dr.N.SridharanN.Chandrasekaran, “Discrete Mathematics”, the National Publishing Company, 2003.
3. Veerajan T., Discrete Mathematics with Graph Theory and Combinatorics”, 10th edition, Tata McGraw Hill Companies,2010.

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1. [www.nptel.ac.in](http://www.nptel.ac.in)
2. Graph Theory A NPTEL Course S.A. Choudum.
3. Graph Theory by Prof. L. Sunil Chandran Computer Science and Automation Indian Institute of Science, Bangalore.

**Mapping of CO’s with PO’s:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1				1		1
CO2	3	1	1			1		1
CO3	3		1			1		1
CO4	3					1	1	1
CO5	3					1	1	1

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XBC205	DIGITAL ELECTRONICS	L	T	P	SS	C
		3	1	1	1	6



C	P	A	L	T	P	SS	H
2.5	0.5	0.5	3	1	3	1	8
<b>PREREQUISITE:</b> NIL							
<b>Course Outcomes</b>			<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to							
<b>CO1</b>	<i>Know</i> the numerical values in various number systems and perform number conversions between different number systems.		Cognitive		Understand		
<b>CO2</b>	<i>Demonstrate</i> the operation of logic gates, Boolean algebra including algebraic manipulation/simplification, application of DeMorgan's theorems and Karnaugh map reduction method.		Cognitive Psychomot or		Understand Apply		
<b>CO3</b>	<i>Identify, Analyze</i> and <i>Design</i> combinational circuits		Cognitive Psychomot or		Understand Apply		
<b>CO4</b>	<i>Analyze</i> and <i>Design</i> sequential digital circuits like flip-flops, registers, counters		Cognitive Psychomot or		Understand Apply		
<b>CO5</b>	<i>Explain</i> the architecture of the Intel 8085 microprocessor for its various applications and <i>Understand</i> 8085 instruction set and develop simple programmes and practice.		Cognitive		Understand		
<b>UNIT I</b>		<b>NUMBER SYSTEMS AND MINIMIZATION TECHNIQUES</b>				<b>9+3+9</b>	
Binary, Octal, Decimal, Hexadecimal-Number base conversions – complements – signed Binary numbers. Binary Arithmetic- Binary codes: Weighted –BCD – 2421 - Gray code-Excess 3 code-ASCII –Error detecting code – conversion from one code to another- Logic Gates : AND, OR, NOT, NAND, NOR, Exclusive – OR and Exclusive – NOR- Implementations of Logic Functions using gates, NAND –NOR implementations.							

**Lab :**Logic gates – verification

<b>UNIT II</b>	<b>BOOLEAN ALGEBRA &amp; SIMPLIFICATION</b>	<b>9+3+9</b>
Boolean Algebra – Basic Theorems and properties – Boolean Functions – Canonical and Standard Forms – Karnaugh Map Simplification – Two, Three Variables – NAND and NOR Implementation – Don't Care Conditions.		
<b>Lab :</b> Application of Boolean functions		
<b>UNIT III</b>	<b>COMBINATIONAL CIRCUITS</b>	<b>9+3+9</b>
Combinational Circuits – Adder - Subtractor – Design and Analysis procedures – Binary Parallel Adder – Decimal Adder – Encoder – Decoder – Multiplexer – Demultiplexer – Magnitude comparators – Read Only Memory (ROM) – Programmable Logic Array(PLA).		
<b>Lab :</b> Applications of combinational circuits.		
<b>UNIT IV</b>	<b>SEQUENTIAL CIRCUIT</b>	<b>9+3+9</b>
Sequential circuits – Latches – Flip-flops – Triggering of Flip-Flops – Analysis of clocked sequential circuits – State reduction and state assignment – Design procedure of clocked sequential circuits – Design of counters – Registers – Shift registers – Ripple counter and Synchronous counter.		
<b>Lab:</b> Design and verify the circuits of Flip Flops, Registers and counters.		
<b>UNIT V</b>	<b>MEMORIES</b>	<b>9+3+9</b>
Classification of memories –RAM organization – Write operation –Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell –Dynamic RAM cell –ROM organization - PROM –EPROM –EEPROM –EAPROM –Programmable Logic Devices.		
<b>Lab :</b> Verification of timing waveforms.		

LECTURE	TUTORIAL	PRACTICAL	SELF- STUDY	TOTAL
45	15	45	15	105+15
<b>TEXT BOOK</b>				
<p>1.M. Morris Mano, “Digital Design”, 3<sup>rd</sup> Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.</p> <p>2.John .M Yarbrough, “Digital Logic Applications and Design”, Thomson- Vikas publishing house, New Delhi, 2002.</p> <p>3.Microprocessor Architecture Programming and Application, Ganonker, Ramesh, PHI Learning, New Delhi.</p>				
<b>REFERENCES:</b>				
<p>1.Salivahanan and S. Arivazhagan, “Digital Circuits and Design”, 2<sup>nd</sup> Edition, Vikas Publishing House Pvt. Ltd New Delhi, 2004</p> <p>2.Charles H.Roth. “Fundamentals of Logic Design”, Thomson Publication Company, 2003.</p> <p>3.Donald P.Leach and Albert Paul Malvino, “Digital Principles and applications”, 5<sup>th</sup> Edition., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.</p>				
<b>E-References:</b>				
<p>1.<a href="http://www.tutorialspoint.com/computer_logical_organization/pdf/quick_guide.pdf">www.tutorialspoint.com/computer_logical_organization/pdf/quick_guide.pdf</a></p> <p>2.<a href="http://www.vlab.co.in/ba_labs_all.php?id=1">www.vlab.co.in/ba_labs_all.php?id=1</a></p> <p>3.<a href="http://www.nptel.ac.in/video.php?subjectId=117105080">www.nptel.ac.in/video.php?subjectId=117105080</a></p> <p>4.<a href="https://www.youtube.com/watch?v=CeD2L6KbtV">https://www.youtube.com/watch?v=CeD2L6KbtV</a></p>				

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc.	PO							PSO	
	1	2	3	4	5	6	7	1	2

<b>CO1</b>	3	2	1	1	0	1	<b>0</b>	1	1
<b>CO2</b>	0	1	3	2	0	2	<b>0</b>	2	2
<b>CO3</b>	1	2	3	0	0	2	<b>0</b>	2	2
<b>CO4</b>	1	2	3	1	0	2	<b>0</b>	1	2
<b>CO5</b>	0	3	0	1	0	2	<b>0</b>	1	2
<b>Average</b>	1	2	2	1	0	2	<b>0</b>	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XUM206</b>			<b>DISASTER MANAGEMENT</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
								<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
2.75	0	0.25						<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>
PREREQUISITE: XES202												
Course Outcomes							Domain		Level			
<b>CO1</b>	<i>Understand and Recognize</i> the concepts of disaster						Cognitive		Understand Remember			
<b>CO2</b>	<i>Recognize and describe</i> the causes and effects of disaster						Cognitive		Understand Remember			
<b>CO3</b>	<i>Describe</i> the various approaches of risk reduction						Cognitive		Remember			
<b>CO4</b>	<i>Demonstrate</i> the inter-relationship between disaster and development						Cognitive		Understand			
<b>CO5</b>	Discuss hazard and vulnerability profile of India and respond to drills related to relief						Cognitive Affective		Remember Response			
<b>UNIT - I</b>		<b>INTRODUCTION TO DISASTERS</b>									<b>6</b>	
Concepts and definitions- Disaster, Hazard, Vulnerability, Resilience, Risks												
<b>UNIT - II</b>		<b>DISASTERS: CLASSIFICATION, CAUSES, IMPACTS</b>									<b>12</b>	
Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters, urban disasters, pandemics, complex emergencies, Climate change												
<b>UNIT - III</b>		<b>APPROACHES TO DISASTER RISK REDUCTION</b>									<b>10</b>	
Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, roles and responsibilities of community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.												
<b>UNIT - IV</b>		<b>INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT</b>									<b>6</b>	

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources

<b>UNIT - V</b>	<b>DISASTER RISK MANAGEMENT IN INDIA</b>	<b>11</b>
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Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation).

The project / fieldwork to understand vulnerabilities work on reduction of disaster risk and build a cultural safety.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	0	0	0	45

**TEXT BOOKS:**

1. Coppola P Damon, "Introduction to International Disaster Management, Butterworth-Heinemann, 2015
2. K. N. Shastri, "Disaster Management in India", Pinnacle Technology, 2012
3. Gupta Anil K, Sreeja S. Nair, "Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Lee Allyn Davis, "Natural Disasters", Infobase Publishing, 2010
5. Andharia J, "Vulnerability in Disaster Discourse", JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008

**REFERENCES:**

1. Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000
2. Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.

**E- RESOURCES:**

1. NIDM Publications at <http://nidm.gov.in>- Official Website of National Institute of Disaster Management (NIDM), Ministry of Home Affairs,
2. <http://cwc.gov.in> , <http://ekdrm.net> , <http://www.emdat.be> ,
3. <http://www.nws.noaa.gov> , <http://pubs.usgs.gov> , <http://nidm.gov.in>
4. <http://www.imd.gov.in>

**Mapping of CO with GA**

COs	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	1					3	2	1				1
CO2	1					3	2	1				1
CO3	1					3	2	1				1
CO4	1					3	2	1				1
CO5	1					3	2	1				1
<b>Total</b>	<b>5</b>					<b>15</b>	<b>10</b>	<b>5</b>				<b>5</b>
<b>Scaled value</b>	<b>1</b>					<b>3</b>	<b>2</b>	<b>1</b>				<b>1</b>

XBC301			MULTIMEDIA SYSTEMS					L	T	P	S	C
								3	0	1	0	4
C	P	A	L	T	P	S	H					
3	1	0	3	0	2	0	5					
<b>PREREQUISITE:</b> XBC103												
<b>Course Outcomes</b>							<b>Domain</b>		<b>Level</b>			
After the completion of the course, students will be able to												
<b>CO1</b>	<i>Identify</i> and <i>describe</i> the Multimedia components, various html tags, Image editing open source software tools						Cognitive		Understand			
<b>CO2</b>	<i>Create</i> webpage with necessary image document (text) and animation and practice in HTML.						Cognitive Psychomotor		Understand Application Set			
<b>CO3</b>	Gain a working knowledge and <i>develop</i> their skills in editing and altering photographs.						Cognitive		Understand Application			

<b>CO4</b>	Students can <i>renovate</i> the damaged photos. And export the files with various formats and printing devices.	Cognitive Psychomotor	Understand Analyze Set
<b>CO5</b>	Students can <i>draw</i> and <i>develop</i> short clips and banners with animation using flash and create Audio files. Using html image editing and 2D animation software, can <i>develop</i> and <i>deploy</i> a complete web site in internet.	Cognitive Psychomotor	Understand Create Set
<b>UNIT I</b>	<b>MULTIMEDIA SYSTEMS DESIGN</b>		<b>9+6</b>
<p><b>Introduction</b> – Multimedia applications and its impact – Multimedia System Architecture –Network architecture for multimedia. Evolving technologies for Multimedia–HDTV-UDTV-3D technologies and digital signal processing. Defining objects for Multimedia systems-Text-image –Audio and Video, Audio-recording</p> <p><b>Lab Experiments Using Image Editing Tools</b></p>			
<b>UNIT II</b>	<b>IMAGE EDITING –BASICS</b>		<b>9+6</b>
<p>Introduction about Image Editor- Navigating - Menus and panels-<b>Working with Images</b>-Zooming &amp;Panning an Image-Working with Multiple Images, Rulers, Guides &amp; Grids- Undoing Steps with History- Adjusting Color with the New Adjustments Panel-The New Masks Panel - The New Note Tool &amp; the Save for Web &amp; Devices Interface- The New Auto-Blend &amp; Auto-Align Layers Commands- The New 3D Commands-<b>Resizing &amp; Cropping Images</b>- Understanding Pixels &amp; Resolution-The Image Size Command-Interpolation Options-Resizing for Print &amp; Web-Cropping &amp; Straightening an Image- Adjusting Canvas Size &amp; Canvas Rotation.</p> <p><b>Lab Experiments Using Image Editing Tools</b></p>			
<b>UNIT III</b>	<b>IMAGE AND TEXT EDITING- LAYERS</b>		<b>9+6</b>
<p><b>Layers</b> -Background Layer- Creating, Selecting, Linking &amp; Deleting Layers- Locking &amp;Merging Layers-Copying Layers, Using Perspective &amp; Layer Styles- Filling &amp; Grouping Layers- Introduction to Blending Modes-Blending Modes, Opacity &amp; Fill Creating &amp; Modifying Text</p> <p><b>Lab Experiments Using Image Editing Tools</b></p>			
<b>UNIT IV</b>	<b>IMAGE AND TEXT EDITING- EFFECTS</b>		<b>9+6</b>



**Photo Retouching** -The Red Eye Tool-The Clone Stamp Tool- The Patch Tool & the Healing Brush Tool-**Color Correction**: -Adjusting Levels-Adjust Curves-**Creating Special Effects**- Getting Started with Filters-Creating Text Effects- Applying Gradients to Text-**Exporting**- Saving with Different File Formats-Saving for Web & Devices-Printing Options

**Lab Experiments Using Image Editing Tools**

<b>UNIT V</b>	<b>2D ANIMATION</b>	<b>9+6</b>
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Exploring the 2D environment – working with images - basic drawing and selection – shapes – color – text – layers – scene and frame label – symbol and instance – animation

**Lab Experiments Using 2D Animation Tools**

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF- STUDY</b>	<b>TOTAL</b>
<b>45</b>	<b>-</b>	<b>30</b>		<b>75</b>

**TEXT BOOK**

- 1.Prabat K Andleigh and KiranThakrar, “Multimedia Systems and Design”, PHI Resent, 2003.
- 2.R.Lavanya, HTML 5, Ane Books Pvt. Ltd, 2011”
- 3.JudithJeffcoate, “Multimedia in practice technology and Applications”, PHI,1998.

**REFERNCES**

- 1.Adobe Photoshop CS 2 - One on One (2005 edition) by Deke McClelland  
Macromedia Flash MX 2004: The Complete Reference by Brian Underdahl
- 2.Foley, Vandam, Feiner, Huges, 2003. “Computer Graphics: Principles & Practice”, Pearson Education, second edition .
3. PhotoShopCS for digital photographers by Colin Smith Publisher: Charles River Media. 1st edition .
4. ActionScript for Flash MX: The Definitive Guide, 2nd Edition By Colin Moock.

**E-REFERENCES**

1. <https://www.youtube.com/watch?v=ZGXS5HoBYAQ>

2. <https://www.youtube.com/watch?v=spoJ7Z8LzW8>

3. [www.tutorialspoint.com/listtutorials/multimedia/1](http://www.tutorialspoint.com/listtutorials/multimedia/1)

4. <http://www.vlab.co.in>

### Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	2	2	2	2	2	1	1	2	2
<b>CO2</b>	2	3	2	1	1	1	1	2	2
<b>CO3</b>	2	2	3	1	2	1	1	3	2
<b>CO4</b>	2	3	1	1	1	1	1	2	2
<b>CO5</b>	2	1	1	2	2	1	1	2	2
<b>Average</b>	2	2	2	1	2	1	1	2	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XBC302			OPERATING SYSTEMS					
C	P	A	L	T	P	SS	C	
4	0	0	4	1	0	1	6	
L	T	P	SS	H				
4	1	0	1	6				
<b>PREREQUISITE</b>			Computer Fundamentals					
<b>Course Outcomes</b>			<b>Domain</b>		<b>Level</b>			
After the completion of the course, students will be able to								
<b>CO1</b>	<i>Identifying</i> the important computer system resources and the role of operating system in their management policies and algorithms.					Cognitive		Remember

<b>CO2</b>	Ability to explain the process scheduling algorithms and Calculate scheduling problems	Cognitive	Understand Apply
<b>CO3</b>	Ability to <i>express various</i> process synchronization issues.	Cognitive	Understand Apply
<b>CO4</b>	Indicate the memory management techniques and importance of file system.	Cognitive	Understand
<b>CO5</b>	<i>Classify</i> functionality and have sound knowledge of various types of operating system android.	Cognitive	Understand
<b>UNIT I</b>	<b>INTRODUCTION TO OPERATING SYSTEM</b>		<b>12+3</b>
What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.			
<b>UNIT II</b>	<b>PROCESS CHARACTERIZATION</b>		<b>12+3</b>
Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Pre-emptive and Pre-emptive Scheduling Algorithms.			
<b>UNIT III</b>	<b>INTER PROCESS COMMUNICATION AND SYNCHRONIZATION</b>		<b>12+3</b>
Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery. Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.			
<b>UNIT IV</b>	<b>MEMORY MANAGEMENT</b>		<b>12+3</b>
Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory. (File and I/O Management, OS security) Directory Structure, File Operations, File Allocation Methods, Device Management, Pipes, Buffer, Shared Memory, Security Policy Mechanism, Protection, Authentication and Internal Access Authorization.			

<b>UNIT V</b>	<b>INTRODUCTION TO ANDROID OPERATING SYSTEM</b>				<b>12+3</b>
Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System, Small Application Development using Android Development Framework.					
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>	
60	15	0	15	75	
<b>Text book</b>					
<ol style="list-style-type: none"> <li>1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.</li> <li>2. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.</li> <li>3. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education ,1997.</li> <li>4. W. Stallings, Operating Systems, Internals &amp; Design Principles 2008 5th Edition, Prentice Hall of India.</li> <li>5. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992</li> </ol>					
<b>E-References</b>					
<ol style="list-style-type: none"> <li>1. NPTEL Evidence, 2009. <i>IISc Bangalore</i>. [Online] Available at:</li> <li>2. <a href="http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Operating%20Systems/New_index1.html">http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Operating%20Systems/New_index1.html</a></li> <li>3. <a href="http://nptel.iitg.ernet.in/Comp_Sci_Engg/IISc%20Bangalore/Operating%20Systems.htm">http://nptel.iitg.ernet.in/Comp_Sci_Engg/IISc%20Bangalore/Operating%20Systems.htm</a></li> </ol>					

**CO Versus PO mapping.**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3	2	1						2
<b>CO2</b>	2	1	2	2			2		2
<b>CO3</b>	2	2	1				2		3
<b>CO4</b>	2	2	1						
<b>CO5</b>	2	1				1			1
<b>Total</b>	11	8	5	2		1	2		8
<b>Scaled Value</b>	3	2	1	1		1	1		2

**0-No relation    1– Low relation    2- Medium relation    3- Highly relation**

<b>XBC303</b>			<b>ALGORITHMS</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>C</b>
								3	1	1	1	6
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>H</b>
2.8	1	0.2						3	1	3	1	7
<b>PREREQUISITE:</b> XBC105												
<b>COURSE OUTCOMES</b>						<b>Domain</b>			<b>Level</b>			
After the completion of the course, students will be able to												
<b>CO1</b>	<i>Recognize</i> to learn good principles of algorithm design.					Cognitive	Remember					
						Psychomotor	Perception					
<b>CO2</b>	<i>Identify</i> and <i>Achieve</i> to learn how to analyses algorithms and estimate their worst -case and average- case behavior (in easy cases);					Cognitive	Understand					
						Psychomotor	Set					
<b>CO3</b>	<i>Illustrate</i> and <i>practice</i> to become familiar with fundamental data structures and with the manner in which these data structures can best be implemented;					Cognitive	Apply					
						Psychomotor	Guided Response					
<b>CO4</b>	<i>Demonstrate</i> To learn how to apply their theoretical knowledge in practice (via the practical component of the course).					Cognitive	Apply					
						Psychomotor	Mechanism					
<b>CO5</b>	<i>Develop</i> and <i>Maintain</i> Advanced Analysis Technique					Cognitive	Create					
						Psychomotor	Complete Overt					
<b>UNIT I</b>	<b>INTRODUCTION</b>						<b>9+3+9</b>					
Introduction: Basic Design and Analysis Techniques of Algorithms, Correctness of Algorithm. Algorithm Design Techniques: Iterative Techniques, Divide and Conquer, Dynamic Programming, Greedy Algorithms.												
<b>Lab</b>												

<ol style="list-style-type: none"> <li>1. Write a test program to implement Divide and Conquer Strategy. Eg: Quick sort algorithm for sorting list of integers in ascending order</li> <li>2. Write a program to implement Merge sort algorithm for sorting a list of integers in ascending order.</li> </ol>				
<b>UNIT II</b>	<b>SORTING AND SEARCHING TECHNIQUES</b>			<b>9+3+9</b>
<p>Elementary Sorting techniques– Bubble Sort, Insertion Sort, Merge Sort, Advanced Sorting techniques- Heap Sort, Quick Sort, Sorting in Linear Time - Bucket Sort, Radix Sort and Count Sort, Searching Techniques- Medians &amp; Order Statistics, complexity analysis.</p> <p><b>Lab</b></p> <ol style="list-style-type: none"> <li>1. Write program to implement the DFS and BFS algorithm for a graph.</li> <li>2. Write program to implement backtracking algorithm for solving problems like N-queens.</li> </ol>				
<b>UNIT III</b>	<b>GRAPHS ALGORITHMS</b>			<b>9+3+9</b>
<p>Graphs Algorithms: Graph Algorithms– Breadth First Search, Depth First Search and its Applications, Minimum Spanning Trees. String Processing</p> <p><b>Lab</b></p> <ol style="list-style-type: none"> <li>1. Write a program to implement the backtracking algorithm for the sum of subsets problem.</li> <li>2. Write program to implement greedy algorithm for job sequencing with deadlines.</li> </ol>				
<b>UNIT IV</b>	<b>LOWER BOUNDING TECHNIQUES</b>			<b>9+3+9</b>
<p>Lower Bounding Techniques: Decision Trees, Balanced Trees, Red-Black Trees</p> <p><b>Lab</b></p> <ol style="list-style-type: none"> <li>1. Write a program to implement Dijkstra’s algorithm for the Single source shortest path problem.</li> <li>2. Write a program that implements Prim’s algorithm to generate minimum cost spanning tree.</li> <li>3. Write a program that implements Kruskal’s algorithm to generate minimum cost spanning tree</li> </ol>				
<b>UNIT V</b>	<b>ADVANCED ANALYSIS TECHNIQUE</b>			<b>9+3+9</b>
<p>Advanced Analysis Technique: Randomized Algorithm, Distributed Algorithm, Heuristics.</p> <p><b>Lab</b></p> <ol style="list-style-type: none"> <li>1. Write program to implement Dynamic Programming algorithm for the 0/1 Knapsack problem.</li> <li>2. Write program to implement Dynamic Programming algorithm for the Optimal Binary Search Tree Problem.</li> </ol>				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>

<b>45</b>	<b>15</b>	<b>45</b>	<b>15</b>	<b>105+15</b>
<b>TEXT BOOKS:</b>				
<ol style="list-style-type: none"> <li>1. T.H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Introduction to Algorithms, PHI, 3rd Edition 2009.</li> <li>2. Sara basse &amp; A.V. Gelder Computer Algorithm – Introduction to Design and Analysis, Publisher – Pearson 3rd Edition 1999</li> </ol>				
<b>REFERENCES:</b>				
<ol style="list-style-type: none"> <li>3. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, 2007.</li> <li>4. Ellis Horowitz, SartajSahni and SanguthevarRajasekaran, “Computer Algorithms”, Galgotia Publications Pvt. Ltd., 2002</li> <li>5. A.V. Aho, J.E. Hopcroft and J.D. Ullman “Data Structures and Algorithms” Pearson Education Delhi, 2002</li> </ol>				
<b>E-REFERENCES:</b>				
<ol style="list-style-type: none"> <li>1. <a href="http://www.tutorialspoint.com">www.tutorialspoint.com</a></li> <li>2. <a href="http://www.nptel.com">www.nptel.com</a></li> <li>3. <a href="http://www.virtuallab.ac.in">www.virtuallab.ac.in</a>Lecture Slides,</li> <li>4. Multiple Choice Questions, Animations Link: <a href="http://highereducation.com/sites/0072967757/student_view0/index.html">http://highereducation.com/sites/0072967757/student_view0/index.html</a></li> <li>5. Lecture Slides : <a href="http://www.mhhe.com/engcs/compsci/forouzan/">http://www.mhhe.com/engcs/compsci/forouzan/</a></li> </ol>				

### Mapping of COs with Pos

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3				1				
<b>CO2</b>	2	3							
<b>CO3</b>	1	3	3	2	2				

<b>CO4</b>	1	3	3	2	2	3	2		
<b>CO5</b>		3	3	3	2	3	2	2	3
<b>Total</b>	7	12	9	7	7	6	4	2	3
<b>Scaled Value</b>	2	3	2	2	2	2	1	1	1

1-5 → 1, 6-10 → 2, 11-15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC304</b>			<b>ALLIED PHYSICS</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
								4	1	0	1	6
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
3	1	0						4	1	0	1	5
<b>PREREQUISITE:</b> Students with fundamental physics knowledge in HSC or SSLC level.												
On the successful completion of the course, students will be able to												
<b>Course Outcome</b>						<b>Domain</b>			<b>Level</b>			
<b>CO1</b>	<i>State</i> the basics of laser and <i>distinguish</i> the various laser systems and <i>identify</i> various optical fiber and source and detector.					<b>Cognitive</b>			Knowledge, Analyze			
<b>CO2</b>	<i>Recall the</i> semiconductor fundamentals and <i>Explain</i> characterization and applications.					<b>Cognitive</b>			Knowledge, Comprehension			
<b>CO3</b>	<i>Know</i> the basics of operational amplifier and <i>Construct</i> various oscillators <i>Explain</i> various applications					<b>Cognitive, Psychomotor</b>			Knowledge, Analysis, Set			
<b>CO4</b>	<i>Understand</i> the digital and gate principles <i>distinguish</i> Boolean algebra from algebra.					<b>Cognitive</b>			Knowledge			



<b>CO5</b>	<i>Know</i> the basics of IC's <i>understand</i> the fabrication methods of IC's			<b>Cognitive</b>	Perception, Knowledge
<b>UNIT - I :</b>	<b>LASER PHYSICS</b>				<b>12+3</b>
Principles of laser– population inversion – meta stable state – conditions for laser actions - Types –Nd-Yag – CO2 laser – Helium – neon laser – applications of lasers.					
<b>UNIT - II :</b>	<b>FIBER OPTICS PHYSICS</b>				<b>12+3</b>
Principle and propagation of light in optical fibers – Numerical Aperture and acceptance angle – Types of optical fibers – Source & detector – LED sensor – Block diagram fiber optics communication system – Applications.					
<b>UNIT - III :</b>	<b>SEMICONDUCTOR PHYSICS</b>				<b>12+3</b>
Semiconductor fundamentals – Properties – Types of semiconductor– Volt – Ampere Characteristics of P-N junction Diode – Zener diode – applications of Zener diodes - Volt – Ampere Characteristics of common emitter NPN transistor, FET, UJT and SCR – Principles of LED and LCD.					
<b>UNIT - IV :</b>	<b>OPERATIONAL AMPLIFIER</b>				<b>12+3</b>
Operational amplifier characteristics – inverting and non-inverting amplifier– adder, subtractor, integrator and differentiator circuits – Wien bridge oscillator – Phase shift oscillators and Twin-T oscillators					
<b>UNIT - V :</b>	<b>INTEGRATED ELECTRONICS</b>				<b>12+3</b>
Basic monolithic ICs – Steps in fabrication of Monolithic IC's – epitaxial growth – masking –etching impurity diffusion fabricating monolithic resistors, diodes, transistors and capacitors – circuit layout – contacts and inter connections– General applications of IC's					
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>SELF - STUDY</b>	<b>PRACTICAL</b>	<b>TOTAL</b>	
<b>60</b>	<b>15</b>	<b>15</b>	<b>0</b>	<b>75+15</b>	
<b>TEXT BOOKS:</b>					
1.	V.K. Mehta, Principles of Electronics, S.Chand and CompanyLtd., 2009.				
2.	Laser Physics – Thiagarajan, Springer				
3.	Digital principles and Applications – Malvino& Leech, McGraw Hill Publication 7 <sup>th</sup> edition, 2011.				
<b>REFERENCE BOOKS:</b>					
1.	Basic Electronics – B.L. Theraja, S Chand & company Ltd, New Delhi.				

2.	Fundamentals of digital computers – Bartee, McGraw-Hill.
3.	A. Mottershed, Semiconductor Devices and Applications, New Age Int Pub,

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc.	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	1	1	0	1	0	1	1
CO2	0	1	3	2	0	2	0	2	2
CO3	1	2	3	0	0	2	0	2	2
CO4	1	2	3	1	0	2	0	1	2
CO5	0	3	0	1	0	2	0	1	2
Average	1	2	2	1	0	2	0	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC307</b>			<b>R PROGRAMMING</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
								1	0	0	0	1
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
0.5	0.4	0.1						1	0	0	0	1
<b>PREREQUISITE:</b> Nil												
<b>COURSE OUTCOMES:</b>												
<b>COURSE OUTCOMES</b>							<b>DOMAIN</b>		<b>LEVEL</b>			
After the completion of the course, students will be able to												
<b>CO1</b>	<i>Recognize</i> the significance of R						Cognitive		Remember			

		Psychomotor	Perception
<b>CO2</b>	<i>Express</i> the knowledge on events and functions of R	Cognitive	Understand
<b>CO3</b>	<i>Employ</i> the understanding of the R and <i>Establishan</i> application programme on their own and actively <i>participate</i> in the teams for designing various projects	Cognitive Psychomotor Affective	Apply Set Respond

Introduction - History - Features - Setting up path - Working with R - Basic Syntax - Variable and Data Types - Operator - Conditional Statements - Looping - Control Statements - Object - Functions –Strings- Vector-Lists-arrays-Packages–Dataframes– Database-Visualization

Lab:

Obtaining user data  
Using conditionals  
Using Random numbers  
Using Iteration  
Using Vector-Lists-arrays  
Using Functions

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
15	0	0	0	15

**TEXT BOOKS:**

1. Hands-On Programming with R, Garrett Golemund, O'Reilly Media, Inc, 2014.

**REFERENCES:**

1. Mastering Predictive Analytics with R, Rui Miguel Forte, 2015 Packt Publishing .

**E-REFERENCES:**

1. <https://www.tutorialspoint.com/r/index.htm>
2. <https://www.statmethods.net/r-tutorial/index.htm>
3. <https://www.guru99.com/r-tutorial.html>
4. <https://www.edureka.co/blog/r-tutorial/>

<b>XBC401</b>	<b>OBJECT ORIENTED PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
		3	0	1	0	4

<b>C</b>	<b>P</b>	<b>A</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
2.5	1	0.5		3	0	2	0	5

**PREREQUISITE: Problem Solving Using C**

<b>Course Outcomes</b>		<b>Domain</b>	<b>Level</b>
After the completion of the course, students will be able to			
<b>CO1</b>	<i>Recognize</i> the concepts of data, abstraction and encapsulation.	Cognitive Psychomotor	Remember Perception
<b>CO2</b>	<i>Memorize</i> the knowledge of classes and objects, packages and write the programs using them.	Cognitive Affective	Understand Receive
<b>CO3</b>	<i>Develop</i> the solution to the Complex problems.	Cognitive	Analyze
<b>CO4</b>	<i>Implement</i> good programming design methods for program development using exception and basic event handling mechanisms.	Cognitive Affective	Apply Respond
<b>CO5</b>	<i>Recognize</i> the typical object-oriented constructs of specific object-oriented programming language.	Cognitive Psychomotor	Understand Set

<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9+6</b>
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Basics: Introduction to Object Oriented Programming and its Basic Features, Basic Components of C++, Characteristics of Object-Oriented Language, Structure of a C++ Program, Flow Control Statements in C++, Functions - Scope of Variables, Inline Functions, Recursive Functions, Pointers to Functions, C++ Pointers, Arrays, Dynamic Memory Allocation and De-Allocation.

**Lab :**

1. Number of vowels and number of characters in a string.
2. Write a function called zeros maller () that is passed with two introduce arguments by reference and set the smaller of the number to zero. Write a man() program to access this function.

<b>UNIT II</b>	<b>OBJECT ORIENTED AND PROCEDURE ORIENTED PROGRAMMING</b>	<b>9+6</b>
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Differences Between Object Oriented and Procedure Oriented Programming, Abstraction, Overview of Object-Oriented Programming Principles, Encapsulation, C++ Classes, Objects, User Defined Types,

Constructors and Destructors, this Pointer, Friend Functions, Data Abstraction, Operator Overloading, Type Conversion.				
<b>Lab :</b>				
3.Demonstration of array of object.				
4. Using this pointer to return a value (return by reference).				
<b>UNIT III</b>	<b>INHERITANCE</b>			<b>9+6</b>
Class Inheritance, Base and Derived Classes, Virtual Base Class, Virtual Functions, Polymorphism, Static and Dynamic Bindings, Base and Derived Class Virtual Functions, Dynamic Binding through Virtual Functions, Pure Virtual Functions, Abstract Classes, Virtual Destructors.				
<b>Lab:</b>				
5.Demonstration of virtual function.				
6. Demonstration of static function				
<b>UNIT IV</b>	<b>FILE STREAMS</b>			<b>9+6</b>
Stream Classes Hierarchy, Stream I/O, File Streams, Overloading the Extraction and Insertion Operators, Error Handling during File Operations, Formatted I/O.				
<b>Lab:</b>				
7. Accessing a particular record in a student's file.				
8. Demonstration of operator overloading.				
<b>UNIT V</b>	<b>EXCEPTION HANDLING</b>			<b>9+6</b>
Exception Handling- Benefits of Exception Handling, Throwing an Exception, the Try Block, Catching an Exception, Exception Objects, Exception Specifications, Rethrowing an Exception, Uncaught Exceptions.				
9. Write a program to create a database for students that contains Name, Enrolment no, Department, Programme using Constructors, destructors, input and output functions ; input and output for 10 people using different methods.				
10. Create a class holding information of the salaries of all the family members (husband, wife, son, daughter). Using friend functions give the total salary of the family.				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF-STUDY</b>	<b>TOTAL</b>

<b>45</b>	<b>0</b>	<b>30</b>	<b>0</b>	<b>75</b>
<b>TEXT BOOKS</b>				
1. Problem solving with C++: The Object of Programming, Walter Savitch, 4th Edition, Pearson Education. 2. C++: The Complete Reference, Herbert Schildt, 4th Edition				
<b>REFERENCES</b>				
1. Object Oriented Programming with C++, Sourav Sahay, 2nd Edition, Oxford 2. The C++ Programming Language, B. Stroutstrup, 3rd Edition, Pearson Education 3. Programming in C++, Ashok N Kamthane. Pearson 2nd Edition				
<b>E-REFERENCE</b>				
1. <a href="https://www.tutorialspoint.com/cplusplus/">https://www.tutorialspoint.com/cplusplus/</a> 2. <a href="http://www.cprogramming.com/tutorial/c++-tutorial.html">www.cprogramming.com/tutorial/c++-tutorial.html</a>				

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	2	1	1	1	1	2	1	1	1
<b>CO2</b>	3	2	2	2	2	2	2	2	1
<b>CO3</b>	2	2	2	2	3	2	2	2	1
<b>CO4</b>	3	2	2	2	2	2	2	3	1
<b>CO5</b>	3	3	3	3	3	3	3	3	1
<b>Average</b>	3	2	2	2	2	2	2	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC402</b>	<b>DATA BASE MANAGEMENT SYSTEM</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b> <b>S</b>	<b>C</b>
		3	1	1	1	6

<b>C</b>	<b>P</b>	<b>A</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>S</b>	<b>H</b>
<b>3</b>	<b>1</b>	<b>0</b>		<b>3</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>8</b>

**PREREQUISITE:** Computer Fundamentals

**Course Outcomes**

**Domain**

**Level**

After the completion of the course, students will be able to

<b>CO1</b>	<i>Recognize and Express</i> the fundamentals of Data Base Management System and Relational database system	Cognitive	Remember Understand
<b>CO2</b>	<i>Recognize and Explain</i> the Transaction Management and Storage implementation techniques	Cognitive	Remember Understand
<b>CO3</b>	<i>Sketch and show</i> the Relational data base design for the real time application.	Cognitive Psychomot or	Apply Set
<b>CO4</b>	<i>Analyze and Apply</i> proper Relational data base queries	Cognitive	Analyze Apply
<b>CO5</b>	<i>Design and Construct</i> an application with suitable form design and data base	Psychomot or	Origination

**UNIT I**

**INTRODUCTION**

**9+3+9**

Basic Database Concepts, Terminology, and Architecture; Types of Database Management Systems. Differences between Relational and other Database Models. Data Modelling: Relations, Schemas, Constraints, Queries, and Updates; Conceptual vs. Physical Modeling; Entity Types, attributes, ER Diagrams.

**Lab:**

**1: E-R Model**

Analyze the organization and identify the entities, attributes and relationships in it. .

Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

**2: Concept design with E-R Model**

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).

<b>UNIT II</b>	<b>RELATIONAL DATABASES</b>	<b>9+3+9</b>
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SQL Data Definition: Specifying Tables, Data Types, Constraints; Simple SELECT, INSERT, UPDATE, DELETE Statements; Complex SELECT Queries, including Joins and Nested Queries; Actions and Triggers; Views; Altering Schemas. Relational Algebra: Definition of Algebra; Relations as Sets; Operations: SELECT, PROJECT, JOIN, etc. Normalization Theory and Functional Dependencies, 2NF, 3NF, BCNF, 4NF, 5NF.

**Lab:**

**3: Relational Model**

Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion.

**4: Normalization**

Apply the First, Second and Third Normalization levels on the database designed for the organization

<b>UNIT III</b>	<b>DATABASE DESIGN</b>	<b>9+3+9</b>
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Indexing: Files, Blocks, and Records, Hashing; RAID; Replication; Single-Level and Multi-Level Indexes; B-Trees and B+-Trees. Query Processing Translation of SQL into Query Plans; Basics of Transactions, Concurrency and Recovery.

**Lab:**

**5: Installation of Mysql and practicing DDL commands**

Installation of MySQL. Creating databases, how to create tables, altering the database, dropping tables and databases if not required. Try truncate, rename commands etc.

**6: Practicing DML commands on the Database created for the example organization**



DML commands are used to for managing data within schema objects. Some examples:

- SELECT - retrieve data from a database
- INSERT - insert data into a table
- UPDATE - updates existing data within a table
- DELETE - deletes all records from a table, the space for the records remain

<b>UNIT IV</b>	<b>TRANSACTION MANAGEMENT</b>	<b>9+3+9</b>
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**DATABASE PROGRAMMING:** Embedded SQL; Dynamic SQL, JDBC; Avoiding Injection Attacks; Stored Procedures; Lightweight Data Access Layers for Python and JavaScript Applications; PHP and MySQL, Object Relational Modeling: Hibernate for Java, Active Record for Rails.

**Lab:**

**7: Querying**

practice queries (along with sub queries) involving ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

**8 and 9: Querying (continued...)**

Practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

<b>UNIT V</b>	<b>IMPLEMENTATION TECHNIQUES</b>	<b>9+3+9</b>
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**BIG DATA:** Motivations; OLAP vs. OLTP; Batch Processing; MapReduce and Hadoop; Spark; Other Systems: HBase. Working with POSTGRES, REDIS, MONGO, and NEO: Setting up the same Database on Four Platforms; Basic Queries and Reporting.

**Lab:**

**10: Triggers**

Work on Triggers. Creation of, insert trigger, delete trigger, update trigger. Practice triggers using the above database

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	15	45	15	105+15

**REFERENCES:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, 2011“Database System Concepts”, Sixth Edition, Tata McGraw Hill.
2. RamezElmasri, Shamkant B. Navathe., 2008. “Fundamentals of Database Systems”, Fifth Edition, Pearson.
3. Raghu Ramakrishnan., 2010. “Database Management Systems”, Fourth Edition, Tata McGraw Hill.
4. G.K.Gupta, 2011.”Database Management Systems”, Tata McGraw Hill.

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	0	1	2	0	1	0	0	3	3
<b>CO2</b>	0	1	1	1	0	0	0	1	1
<b>CO3</b>	1	3	1	1	1	0	0	3	3
<b>CO4</b>	1	3	2	1	1	1	1	3	3
<b>CO5</b>	3	3	2	2	1	1	1	3	2
<b>Average</b>	1	2	2	1	1	0	0	3	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC403</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>C</b>
			4	1	0	1	6
<b>C</b>	<b>P</b>	<b>A</b>	<b>STATISTICS</b>				
<b>3.0</b>	<b>0.5</b>	<b>0.5</b>					
			4	1	0	1	6

**PREREQUISITE:** SOME BASIC KNOWLEDGE OF STATISTICS IS REQUIRED

**COURSE OUTCOMES:**

<b>Course outcomes:</b>		<b>Domain</b>	<b>Level</b>
<b>CO1:</b>	Explain the statistical data in the form of table, diagram and graph.	Cognitive	Applying
<b>CO2:</b>	Find the measures of central tendency and measures of dispersion and skewness for the given data.	Cognitive Understanding	Applying
<b>CO3:</b>	Evaluate correlation coefficient using Karl Pearson's and find the regression line for the given data.	Cognitive	Understanding Applying
<b>CO4:</b>	Solve the problem in the time series using the method of seasonal variation and find the interpolation using Newtons and Lagranges method	Cognitive Psychomotor	Applying Imitation
<b>CO5:</b>	Find the index number using aggregative, relative and cost of living index number method. Define the sampling technique and Apply the concept of test of significance for t, f and chi-square.	Cognitive Affective	Remembering Applying Receiving

<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>12+3</b>
Introduction - Classification and tabulation of statistical data - Diagrammatic and graphical representation of data.		
<b>UNIT II</b>	<b>MEASURES OF CENTRAL TENDENCY</b>	<b>12+3</b>
Measures of Central tendency - Mean, Median and Mode - Dispersion, Range, Quartile deviation, Mean Deviation, Standard Deviation - Measures of Skewness.		

<b>UNIT III</b>	<b>CORRELATION</b>				<b>12+3</b>
Correlation - Karl Pearson's co-efficient of correlation - Spearman's Rank Correlation regression lines and Co-efficient.					
<b>UNIT IV</b>	<b>TIME SERIES ANALYSIS</b>				<b>12+3</b>
Time series Analysis - Trend - Seasonal variations - Interpolation - Newtons and Lagranges method of estimation.					
<b>UNIT V</b>	<b>INDEX NUMBERS</b>				<b>12+3</b>
Index numbers - aggregative and relative index - chain and fixed index - Cost of living index - Sampling Techniques - types of sample and sampling procedure - tests of significance - Normal, t, F, chi-square - Simple Problems.					
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF-STUDY</b>	<b>TOTAL</b>	
<b>60</b>	<b>15</b>	<b>0</b>	<b>15</b>	<b>75+15</b>	
<b>TEXT</b>					
1. Statistical methods - S.P. Gupta - S. Chand & Co., New Delhi.					
<b>REFERENCES</b>					
1. The Fundamentals of Statistics - Elhance. Elhance publication. 2. Business Mathematics and Statistics - Dr. P. R. Vittal - Margham Publications, Chennai.					
<b>E REFERENCES</b>					
<a href="http://www.nptel.ac.in">www.nptel.ac.in</a> Advanced Engineering Mathematics by Prof. Somesh Kumar Department of Mathematics, Indian Institute of Technology, Kharagpur.					

**TABLE 1: COs VS GAs Mapping**

	<b>GA1</b>	<b>GA2</b>	<b>GA3</b>	<b>GA4</b>	<b>GA5</b>	<b>GA6</b>	<b>GA7</b>	<b>GA8</b>	<b>GA9</b>	<b>GA10</b>
<b>CO 1</b>	3	2		1	1				1	
<b>CO 2</b>	3	2		1					1	
<b>CO 3</b>	3	2		1					1	0
<b>CO 4</b>	3	2		1	1				1	0

<b>CO 5</b>	3	2		1	1				1	0
	15	10	0	5	3	0	0	0	0	5

*1 - Low , 2 – Medium , 3- high*

<b>XBC404</b>			<b>PRINCIPLES OF MANAGEMENT</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>C</b>
								<b>4</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>6</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>H</b>
<b>3</b>	<b>0.5</b>	<b>0.5</b>						<b>4</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>6</b>
<b>PREREQUISITE:</b> Basic principles in an organization.												
<b>Course Outcomes</b>							<b>Domain</b>		<b>Level</b>			
After the completion of the course, students will be able to												
<b>CO1</b>	<i>Recognize</i> the significance of Management Principle.						Cognitive	Remember				
							Psychomotor	Perception				
<b>CO2</b>	<i>Express</i> the understanding of the concept of planning the events in organization.						Cognitive	Understand				
<b>CO3</b>	<i>Employ</i> the understanding of the various scheduling activities and actively <i>participate</i> in terms for the organizing of various events in organization.						Cognitive	Apply				
							Affective	Respond				
<b>CO4</b>	<i>Utilize</i> the directing effectively in the real-world class room management.						Cognitive	Apply				
<b>CO5</b>	<i>Design</i> and <i>Establish</i> the principles of management concept in day to day activities.						Cognitive	Create Set				
							Psychomotor					
<b>UNIT I</b>			<b>OVERVIEW OF MANAGEMENT</b>							<b>12+3</b>		

Definition - Management - Role of managers - Evolution of Management Thought-Organization and the environmental factors – Trends and Challenges of Management in Global Scenario.				
<b>UNIT II</b>	<b>PLANNING</b>			<b>12+3</b>
Nature and purpose of planning - Planning process - Types of plans –Objectives - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision Decision Making Process - Rational Decision-Making Process - Decision Making under different conditions.				
<b>UNIT III</b>	<b>ORGANIZING</b>			<b>12+3</b>
Nature and purpose of organizing - Organization structure - Formal and informal groups organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - -Performance Appraisal.				
<b>UNIT IV</b>	<b>DIRECTING</b>			<b>12+3</b>
Creativity and Innovation - Motivation and Satisfaction - Motivation Theories - Leadership Styles - Leadership theories - Communication - Barriers to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.				
<b>UNIT V</b>	<b>CONTROLLING</b>			<b>12+3</b>
Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations.				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>
<b>60</b>	<b>15</b>	<b>--</b>	<b>15</b>	<b>75+15</b>
<b>REFERENCES:</b>				
1. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India,8th edition.				

2. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.
3. Hellriegel, Slocum & Jackson, ' Management - A Competency Based Approach', Thomson South Western, 10th edition, 2007.
4. <https://www.pearsonhighered.com>
5. [www.miracleworx.com](http://www.miracleworx.com)

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	0	0	1	1	0	0	0	2	2
CO2	0	1	0	1	0	1	1	2	2
CO3	0	2	2	1	1	2	2	2	1
CO4	0	1	1	1	0	1	1	2	2
CO5	0	1	1	1	0	1	1	3	3
Average	0	1	1	1	1	1	1	2	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>XBC406</b>			<b>ANGULAR JS</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>C</b>
								1	0	0	0	1
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>H</b>
0.5	0.5	0						1	0	0	0	1

**PREREQUISITE:** Nil

**COURSE OUTCOMES:**

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
<b>CO1:</b>	<i>Recognize</i> the fundamentals and techniques of Angular JS.	Cognitive	Remember
<b>CO2:</b>	<i>Express</i> the knowledge on Invoking, MVC, Validation, Communication over http, cookies and file upload in AngularJS	Cognitive Psychomotor	Understand Guided Response

Introduction to AngularJS - Invoking Angular - Model View Controller - Formatting Data with Filters - Changing Views with Routes and \$location - Validating User Input - Project Organization - Tools - Running Your Application - Testing with AngularJS - Relationship Between Model, Controller, and Template - Communicating Over \$http - Directives and HTML Validation - API Overview - Communicating Between Scopes with \$on, \$emit, and \$broadcast - Cookies - Internationalization and Localization - Wrapping a jQueryDatepicker - File Upload in AngularJS

**Lab:**

1. Create single page web applications using the MVC pattern of AngularJS
2. Understand the programming model provided by the AngularJS framework
3. Define Angular controllers and directives
4. Control Angular data bindings

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
15	0	0	0	15

**TEXTBOOKS**

1. Brad Green, ShyamSeshadri "AngularJS", O'Reilly Media, 2013.
2. Ken Williamson "Learning AngularJS: A Guide to AngularJS Development" O'reilly Media, 2015.

**REFERENCES**

Diego Netto, Valeri Karpov Professional AngularJS : A Concise Approach Wiley 2015

**E-REFERENCES**

1. <https://www.w3schools.com/angular/>
2. [www.tutorialsteacher.com/angularjs/angularjs-tutorials](http://www.tutorialsteacher.com/angularjs/angularjs-tutorials)

<b>XBC501A</b>	<b>MATLAB PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>4</b>



<b>C</b>	<b>P</b>	<b>A</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0.5</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>5</b>
<b>Prerequisite</b>			<b>Computer Fundamentals</b>				
<b>Course Outcome</b>			<b>Domain</b>	<b>Level</b>			
<b>CO1</b>	<b>Recognize</b> the fundamentals of procedural and functional programming.					<b>Cognitive</b>	<b>Remember</b>
<b>CO2</b>	<b>Express</b> the functionalities of Matlab data types and structures					<b>Cognitive</b>	<b>Understand</b>
<b>CO3</b>	<b>Describe</b> the concepts and guidelines of Be able to set up simple real-life numerical problems such that they can be solved and visualized using basic codes in Matlab.					<b>Cognitive</b>	<b>Understand</b>
<b>CO4</b>	Actively <b>Participate</b> in <b>Choosing</b> the appropriate techniques and methods for the real time applications as a team.					<b>Affective</b> <b>Cognitive</b>	<b>Response</b> <b>Apply</b>
<b>CO5</b>	<b>Analyze</b> the techniques used in the various stages of Software Engineering.					<b>Cognitive</b>	<b>Analyze</b>
<b>UNIT I</b>	<b>INTRODUCTION TO MATLAB</b>						<b>9+6</b>
Introduction to MATLAB Programming- Basics of MATLAB programming, Array operations in MATLAB, Loops and execution control, working with files: Scripts and Functions, Plotting and program output.							
<b>Lab:</b>							
Explore MATLAB							
Arithmetic Operations							
Arrays							
<b>UNIT II</b>	<b>APPROXIMATIONS AND ERRORS</b>						<b>9+6</b>
Approximations and Errors- Defining errors and precision in numerical methods, Truncation and round-off errors, Error propagation, Global and local truncation errors.							
<b>Lab:</b>							

Functions

Control flow

Plotting

**UNIT  
III**

**LINEAR EQUATIONS**

**9+6**

Linear Equations- Linear algebra in MATLAB, Gauss Elimination, LU decomposition and partial pivoting, Iterative methods: Gauss Siedel Method.

**Lab:**

Programming in MATLAB

Loading and saving data

Linear equations

**UNIT  
IV**

**REGRESSION AND INTERPOLATION**

**9+6**

Regression and Interpolation- Introduction, Linear least squares regression (including lsqcurvefit function), Functional and nonlinear regression (including lsqnonlin function), Interpolation in MATLAB using spline and pchip.

**Lab:**

Linear regression

Linear least squares regression

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<b>UNIT V</b>	<b>NON - LINEAR EQUATIONS</b>	<b>9+6</b>
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Nonlinear Equations- Nonlinear equations in single variable, MATLAB function fzero in single variable, Fixed-point iteration in single variable, Newton- Raphson in single variable, MATLAB function fsolve in single and multiple variables, Newton-Raphson in multiple variables.

**Lab:**

Nonlinear Equations

Newton- Raphson in single variable

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	0	30	0	75

**TEXT BOOKS:**

1. Fausett L.V.(2007) Applied Numerical Analysis Using MATLAB, 2nd Ed., Pearson Education
2. Essential MATLAB for Engineers and Scientists, 6th Edition, Brian Hahn; Daniel T. Valentine, Academic Press, Web ISBN -13: 978-0-12-805271-6,

**REFERENCES:**

1. Roger.S.Pressman, Software Engineering A Practitioner’s Approach, Sixth Edition, Tata McGraw Hill Higher Education, 2010.
2. Ian Sommerville, Software Engineering, Ninth Edition, Pearson Education Inc., 2012.

**E-REFERENCES:**

1. <http://www.rspa.com/spi/>
2. <https://www.wiziq.com/tutorials/software-engineering>
3. <http://www.tutorialride.com/software-engineering/software-engineering-tutorial.htm>
4. [https://www.tutorialspoint.com/software\\_engineering/software\\_engineering\\_tutorial.pdf](https://www.tutorialspoint.com/software_engineering/software_engineering_tutorial.pdf)

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	2	1	1	1	1	2
CO2	3	1	3	2	1	1	1	1	2
CO3	2	2	2	2	1	2	1	1	1
CO4	3	2	2	2	1	1	1	2	2
CO5	2	2	2	2	2	1	1	2	1
Average	2	2	2	2	1	1	1	1	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>XBC501B</b>			<b>PROGRAMMING IN JAVA</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>ss</b>	<b>C</b>
								<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>ss</b>	<b>H</b>
<b>3.5</b>	<b>0.5</b>	<b>0</b>						<b>3</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>5</b>
<b>PREREQUISITE:</b> Computer Fundamentals												
<b>Course Outcomes</b>							<b>Domain</b>	<b>Level</b>				
After the completion of the course, students will be able to												
<b>CO1</b>	<b>Recognize and Express</b> the fundamentals of Data Base Management System and Relational database system						Cognitive	Remember Understand				
<b>CO2</b>	<b>Recognize and Explain</b> the Transaction Management and Storage implementation techniques						Cognitive	Remember Understand				

<b>CO3</b>	<i>Sketch and show</i> the Relational data base design for the real time application.	Cognitive Psychomotor	Apply Set
<b>CO4</b>	<i>Analyze and Apply</i> proper Relational data base queries	Cognitive	Analyze Apply
<b>CO5</b>	<i>Design and Construct</i> an application with suitable form design and data base	Psychomotor	Origination
<b>UNIT I</b>	<b>INTRODUCTION</b>		<b>9+6</b>
<p>Fundamentals of Object-Oriented Programming – Java Evolution – Overview of Java Language – Constants, Variables and Data Types – Operators and Expressions – Decision Making and Branching – Decision Making and Looping</p> <p><b>Lab</b></p> <ol style="list-style-type: none"> <li>1. Simple Java Programs</li> <li>2. Decision Making, Branching and Looping</li> </ol>			
<b>UNIT II</b>	<b>CLASSES, OBJECTS AND METHODS</b>		<b>9+6</b>
<p>Introduction – Defining a Class – Adding Variables – Adding Methods – Creating Objects – Accessing Class Members – Constructors – Method Overloading – Static Members – Nesting of Methods – Inheritance – Overriding Methods – Final Variables and Methods – Final Classes – Finalizer Methods – Abstract Methods and Classes – Visibility Control</p> <p><b>Lab</b></p> <ol style="list-style-type: none"> <li>3. Constructors and Method Overloading</li> <li>4. Inheritance and Method Overriding</li> </ol>			
<b>UNIT III</b>	<b>ARRAYS, INTERFACE AND PACKAGES</b>		<b>9+6</b>
<p>Arrays - One-Dimensional Array – Creating an array – Two-Dimensional Array – Strings – Vectors – Wrapper Classes – Interfaces: Multiple Inheritance – Packages</p> <p><b>Lab</b></p> <ol style="list-style-type: none"> <li>5. Arrays and Strings</li> <li>6. Interfaces and Packages</li> </ol>			
<b>UNIT IV</b>	<b>MULTITHREADED PROGRAMMING</b>		<b>9+6</b>

Creating Threads – Extending the Thread Class – Stopping and Blocking a Thread – Life Cycle of a Thread – Using Thread Methods – Thread Exceptions – Thread Priority – Synchronization – Implementing the ‘Runnable’ Interface – Managing Errors and Exceptions – Types of Errors – Exceptions – Multiple Catch Statements – Using Finally Statement – Throwing our own Exceptions

**Lab**

- 7. Multi Threading
- 8. Exception Handling

<b>UNIT V</b>	<b>APPLET PROGRAMMING</b>	<b>9+6</b>
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Introduction – Applet Life Cycle – Creating an Executable Applet – Designing a Web Page – Applet Tag – Adding Applet to HTML File – Running the Applet – Passing Parameters to Applets – Getting Input from the User - Abstract Windowing Toolkit

**Lab**

- 9. Applet Programming
- 10. Event Handling

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	-	30	-	75

**REFERENCES:**

1. Bruce Eckel, Thinking in Java (4<sup>th</sup>edition) Herbert Schildt,
2. Java: The Complete Reference (9<sup>th</sup>edition)
3. Y. Daniel Liang, Introduction to Java Programming (10<sup>th</sup>edition)
4. Paul Deitel, Harvey Deitel, Java: How To Program (10<sup>th</sup>edition)
5. Cay S. Horstmann, Core Java Volume I –Fundamentals (10<sup>th</sup>edition)

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	0	1	2	0	1	0	0	3	3
<b>CO2</b>	0	1	1	1	0	0	0	1	1
<b>CO3</b>	1	3	1	1	1	0	0	3	3
<b>CO4</b>	1	3	2	1	1	1	1	3	3
<b>CO5</b>	3	3	2	2	1	1	1	3	2
<b>Average</b>	1	2	2	1	1	0	0	3	2

1-5 → 1, 6 -10 → 2, 11 -15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC501C</b>			<b>PYTHON PROGRAMMING</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>C</b>
								<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>H</b>
<b>3.5</b>	<b>0.25</b>	<b>0.25</b>						<b>3</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>5</b>
<b>PREREQUISITE: XBC402</b>												
<b>Course Outcomes</b>							<b>Domain</b>		<b>Level</b>			
After the completion of the course, students will be able to												
<b>CO1</b>	<i>Analyze</i> Multidimensional Intelligent model from typical system						Cognitive		Analyze			
<b>CO2</b>	<i>Evaluate</i> various mining techniques on complex data objects						Cognitive		Evaluate			
<b>CO3</b>	<i>Understand</i> Data Mining processes using Open Source Data Mining tool.						Cognitive		Understand			
<b>CO4</b>	<i>Choose</i> the appropriate techniques and algorithms for extracting data						Cognitive Affective		Apply Respond			
<b>CO5</b>	<i>Recognize</i> the knowledge of data mining, data preprocessing and data warehousing						Cognitive Psychomotor		Analyze Perception			
<b>UNIT I</b>		<b>INTRODUCTION</b>							<b>9+6</b>			
Introduction to Python, Python, Features of Python, Execution of a Python, Program, Writing Our First Python Program, Data types in Python. Python Interpreter and Interactive Mode; Values and Types: int, float, boolean, string, and list; Variables, Expressions, Statements, TupleAssignment, Precedenceof Operators, Comments; Modules and Functions, Function Definition and use, Flow of Execution, Parameters and Arguments.												
<b>Lab:</b>												

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.

<b>UNIT II</b>	<b>OPERATORS IN PYTHON</b>	<b>9+6</b>
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Operators in Python, Input and Output, Control Statements. Boolean Values and operators, Conditional (if), Alternative (if-else), Chained Conditional (if-else if-else); Iteration: state, while, for, break, continue, pass; Fruitful Functions: Return Values, Parameters, Local and Global Scope, Function Composition, Recursion.

**Lab:**

4. Write a python script to print the current date in the following format “Fri Oct 11 02:26:23 IST 2019”
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.

<b>UNIT III</b>	<b>ARRAYS IN PYTHON</b>	<b>9+6</b>
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Arrays in Python, Strings and Characters. Strings: String Slices, Immutability, String Functions and Methods, String Module; Lists as Arrays. Illustrative Programs: Square Root, gcd, Exponentiation, Sum an Array of Numbers, Linear Search, Binary Search.

**Lab:**

7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a Python program to construct the following pattern, using a nested for loop

```

*
* *
* * *
* * * *
* * * * *
* * * *
* * *
* * *

```



* *					
*					
<b>UNIT IV</b>	<b>FUNCTIONS</b>			<b>9+6</b>	
<p>Functions, Lists and Tuples. List Operations, List Slices, List Methods, List Loop, Mutability, Aliasing, Cloning Lists, List Parameters; Tuples: Tuple Assignment, Tuple as Return Value; Dictionaries: Operations and Methods; Advanced List Processing - List Comprehension; Illustrative Programs: Selection Sort, Insertion Sort, Merge sort, Histogram.</p> <p><b>Lab:</b></p> <p>10. Write a Python script that prints prime numbers less than 20.</p> <p>11. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.</p> <p>12. Write a python program to define a module and import a specific function in that module to another program.</p>					
<b>UNIT V</b>	<b>FILES AND EXCEPTION</b>			<b>9+6</b>	
<p>Files and Exception: Text Files, Reading and Writing Files, Format Operator; Command Line Arguments, Errors and Exceptions, Handling Exceptions, Modules, Packages; Illustrative Programs: Word Count, Copy File.</p> <p><b>Lab:</b></p> <p>13. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.</p> <p>14. Write a Python class to convert an integer to a roman numeral.</p> <p>15. Write a Python class to reverse a string word by word.</p>					
<b>LECTURE</b>		<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF-STUDY</b>	<b>TOTAL</b>
<b>45</b>		<b>0</b>	<b>30</b>	<b>0</b>	<b>75</b>
<b>TEXTBOOKS:</b>					
<ol style="list-style-type: none"> <li>1. Mark Lutz, Learning Python</li> <li>2. Tony Gaddis, starting out with Python</li> <li>3. Kenneth A. Lambert, Fundamentals of Python</li> </ol>					
<b>REFERENCES:</b>					
1. James Payne, Beginning Python using Python 2.6 and Python 3					

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	3	2	2	1	1	1	3
CO2	2	3	2	3	1	1	1	2	3
CO3	3	2	3	2	2	2	1	2	3
CO4	3	2	2	3	1	1	1	1	3
CO5	2	3	2	2	2	2	1	2	3

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>XBC502A</b>			<b>SOFTWARE ENGINEERING</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>C</b>
								4	2	0	0	6
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>H</b>
<b>2.9</b>	<b>0</b>	<b>0.1</b>						4	2	0	0	6
<b>Prerequisite</b>			Computer Fundamentals									
<b>Course Outcome</b>							<b>Domain</b>		<b>Level</b>			
CO1	<b>Recognize</b> the significance of entire Software Engineering process.						Cognitive		Remember			
CO2	<b>Express</b> the functionalities of Cost Estimation and Requirement Specification Techniques.						Cognitive		Understand			
CO3	<b>Describe</b> the concepts and guidelines of Software Design, Coding, Testing and Maintenance.						Cognitive		Understand			
CO4	Actively <b>Participate</b> in <b>Choosing</b> the appropriate techniques and methods for the real time applications as a team.						Affective Cognitive		Response Apply			

CO5	<i>Analyze</i> the techniques used in the various stages of Software Engineering.	Cognitive	Analyze
<b>UNIT I</b>	<b>INTRODUCTION AND PLANNING A SOFTWARE PROJECT</b>		<b>12+6</b>
Introduction - Definitions – Size Factors – Quality and Productivity factors – Managerial Issues.Planning a Software Project – Defining the Problem – Developing a Solution Strategy – Planning the Development Process – Planning an Organizational Structure – Other Planning Activities.			
<b>UNIT II</b>	<b>COST ESTIMATION AND REQUIREMENTS SPECIFICATION</b>		<b>12+6</b>
Software Cost Estimation – Cost Factors – Cost Estimation Techniques – Staffing – Level Estimation – Estimating Software Maintenance Costs.Software Requirements Definition – Software Requirement Specification – Formal Specification Techniques – Language and Processors for Requirements.			
<b>UNIT III</b>	<b>SOFTWARE DESIGN</b>		<b>12+6</b>
Software Design – Fundamental Design Concepts – Modules and Modularization Criteria – Design Notations – Design Techniques – Detailed Design Considerations – Real Time and Distributed System design – Test Plans – Milestones, Walkthroughs and Inspections – Design Guidelines.			
<b>UNIT IV</b>	<b>IMPLEMENTATION</b>		<b>12+6</b>
Implementation Issues – Structured Coding Techniques – Coding Style – Standard and Guidelines – Documentation guidelines – Data Abstraction – Exception Handling – Concurrency Mechanisms.			
<b>UNIT V</b>	<b>TESTING AND MAINTENANCE</b>		<b>12+6</b>
Verification and Validation Techniques – Quality Assurance – Walkthroughs and Inspections – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing – Formal Verification.Software Maintenance – Enhancing Maintainability during			

Development – Managerial aspects – Configuration Management – Source Code Metrics – Other Maintenance Tools and Techniques.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
60	30	-	-	90

**TEXT BOOKS:**

Richard E.Fairley, Software Engineering Concepts, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008.

**REFERENCES:**

1.Roger.S.Pressman, Software Engineering A Practitioner’s Approach, Sixth Edition, Tata McGraw Hill Higher Education, 2010.

2.Ian Sommerville, Software Engineering, Ninth Edition, Pearson Education Inc., 2012.

**WEBSITES:**

1.<http://www.rspa.com/spi/>

2.<https://www.wiziq.com/tutorials/software-engineering>

3.<http://www.tutorialride.com/software-engineering/software-engineering-tutorial.htm>

4.[https://www.tutorialspoint.com/software\\_engineering/software\\_engineering\\_tutorial.pdf](https://www.tutorialspoint.com/software_engineering/software_engineering_tutorial.pdf)

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	2	1	1	1	1	2
CO2	3	1	3	2	1	1	1	1	2
CO3	2	2	2	2	1	2	1	1	1
CO4	3	2	2	2	1	1	1	2	2
CO5	2	2	2	2	2	1	1	2	1

Average	2	2	2	2	1	1	1	1	2
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3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>XBC502B</b>			<b>COMPUTER ETHICS</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
								<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>6</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>2.5</b>	<b>0.5</b>	<b>0</b>						<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>6</b>
<b>PREREQUISITE: XBC103</b>												
On the successful completion of the course, students will be able to												
<b>Course Outcome</b>						<b>Domain</b>		<b>Level</b>				
<b>CO1</b>	<i>State</i> the basics of graphics and <i>identify</i> how they can be used in computer.					<b>Cognitive</b>		Knowledge, Analyze				
<b>CO2</b>	<i>Recall</i> and <i>distinguish</i> the various 2-D Geometrical transforms and their applications.					<b>Cognitive</b>		Knowledge, Comprehension				
<b>CO3</b>	<i>Explain</i> the basic elements of 3-D Object representation, and <i>identify</i> various 3D transformation techniques					<b>Cognitive</b>		Comprehension, Analysis				
<b>CO4</b>	<i>Know</i> about visible surface detection methods					<b>Cognitive</b>		Knowledge				
<b>CO5</b>	<i>Construct</i> various computer animation methods and <i>choose</i> animation for an application.					<b>Psychomotor</b>		Perception, Set				
<b>UNIT - I</b>		<b>Introduction</b>						<b>12+6</b>				
The Need for Computer Ethics Training and Historical Milestones.												
<b>UNIT - II</b>		<b>Computer Ethics</b>						<b>12+6</b>				
Defining the Field of Computer Ethics, Computer ethics codes, Sample Topics in Computer Ethics i. Computer crime and computer security ii. Software theft and intellectual property rights iii. Computer hacking and the creation of viruses iv. Computer and information system failure v. Invasion of privacy. Privacy in the Workplace and on the Internet vi. Social												

implications of artificial intelligence and expert systems vii. The information technology salesman issues.

**UNIT - III      Transparency      12+6**

Transparency and Virtual Ethics, Free Speech, Democracy, Information Access.

**UNIT - IV      Developing the Ethical Analysis      12+6**

Developing the Ethical Analysis Skills and Professional Values, Privacy, Accountability, Government Surveillance.

**UNIT - V      Boundaries of Trust      12+6**

Boundaries of Trust, Trust Management, Wikipedia, Virtual Trust, Plagiarism in Online Environment, Intellectual Property, Net neutrality

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
60	30	0	0	90

**TEXT BOOKS:**

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson education.
2. "Computer Graphics Second edition", Zhigandxiang, Roy Plastock, Schaum's outlines, Tata McGraw hill edition.

**REFERENCE BOOKS:**

1. Deborah, J, Nissenbaun, H, Computing, Ethics & Social Values, Englewod Cliffs, New Jersey, Prentice Hall, 1995.
2. Spinello, R, Tavani, H, T, Readings in Cyberethics, Sudbury, MA, Jones and Bartlett Publishers, 2001.
3. Bynum, T, W; Rogerson, S, Computer Ethics and Professional Responsibility, Blackwell, 2004

<b>XBC502C</b>	<b>COMPUTER ORGANIZATION &amp; ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>C</b>
		4	2	0	0	6

C	P	A	L	T	P	S	H
3	0	0	4	2	0	0	6
<b>PREREQUISITE:</b> Digital Principles							
<b>Course Outcomes</b>			<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to							
<b>CO1</b>	<i>Recognize</i> the operation of functional units of a computer			Cognitive Psychomotor		Knowledge	
<b>CO2</b>	<i>Describe</i> the computational operation of hardware units associated with a computing device.			Cognitive		Comprehension	
<b>CO3</b>	<i>Demonstrate</i> the operation of processing unit.			Cognitive Psychomotor		Application	
<b>CO4</b>	<i>Compare</i> the performance of different types of memory			Cognitive		Analyze	
<b>CO5</b>	<i>Recognize</i> the operation of interfacing devices.			Cognitive		Knowledge	
<b>UNIT I</b>	<b>BASIC STRUCTURE OF COMPUTERS</b>					<b>12+6</b>	
Functional Units - Bus Structures - Performance - Evolution - Machine Instructions and programs - Memory operations - Instruction and instruction sequencing - addressing modes - Basic I/O operations - stacks and queues - subroutines - Encoding of Machine instructions.							
<b>UNIT II</b>	<b>ARITHMETIC UNIT</b>					<b>12+6</b>	
Arithmetic - Design of fast adders - Binary Multiplication - Division - Floating point numbers and operations.							
<b>UNIT III</b>	<b>BASIC PROCESSING UNIT</b>					<b>12+6</b>	

Processing unit - Fundamental concepts - Execution of a complete instruction - Multiple bus organization - Hardwired control – Micro programmed control - pipelining - Basic concepts - Hazards - Inference on instruction sets. Data path and control considerations - Performance issues.				
<b>UNIT IV</b>	<b>MEMORY SYSTEM</b>			<b>12+6</b>
RAM and ROM - Cache memories - Performance considerations - Virtual memories – secondary storage devices - Associative memories.				
<b>UNIT V</b>	<b>INPUT / OUTPUT ORGANIZATION</b>			<b>12+6</b>
Accessing I/O devices - Interrupts - DMA - Buses - Interface circuits - standard I/O Interfaces. Case study of one RISC and one CISC processor.				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF-STUDY</b>	<b>TOTAL</b>
<b>60</b>	<b>30</b>	<b>0</b>	<b>0</b>	<b>90</b>
<b>TEXT BOOKS</b>				
1. Carl Hamacher, Zvonko Uranesic, Safvat Zaby., 2002. “Computer Organisation”, 5th edition, McGraw Hill.				
2. John P Hayes, “Computer Architecture and Organisation”, 3rd edition, McGraw Hill .				
<b>REFERENCES</b>				
1. David A Patterson and John L. Hennessy, 2002. “ Computer Organization and Design The Hardware / Software Interface”, 2nd edition, Harcourt Asia, Morgan Kaufmann.				
<b>E-REFERENCE</b>				
1. <a href="http://www.tutorialspoint.com/computer_logical_organization/">www.tutorialspoint.com/computer_logical_organization/</a>				
2. <a href="http://nptel.ac.in/courses/106106092/">nptel.ac.in/courses/106106092/</a>				

### Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3	2	3	2	2	1	1	1	3



<b>CO2</b>	2	3	2	3	1	1	1	2	3
<b>CO3</b>	3	2	3	2	2	2	1	2	3
<b>CO4</b>	3	2	2	3	1	1	1	1	3
<b>CO5</b>	2	3	2	2	2	2	1	2	3

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No relation

<b>1.14 XBC502</b>			<b>COMPUTER NETWORKS</b>				<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
							<b>4</b>	<b>2</b>	<b>0</b>	<b>6</b>
<b>D</b>							<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
							<b>4</b>	<b>2</b>	<b>0</b>	<b>6</b>
<b>C</b>	<b>P</b>	<b>A</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.8</b>	<b>0</b>	<b>0.2</b>					<b>4</b>	<b>2</b>	<b>0</b>	<b>6</b>
<b>COURSE OUTCOMES</b>						<b>DOMAIN</b>		<b>LEVEL</b>		
After the completion of the course, students will be able to										
<b>CO1</b>	<i>Recognize</i> the importance of computer networks and <i>explain</i> the network models, media, layering.					Cognitive		Remember		
						Psychomotor		Guided		
<b>CO2</b>	<i>Describe</i> the functionalities of layer and <i>indicate</i> the various network connecting devices.					Cognitive		Understand		
<b>CO3</b>	<i>Demonstrate</i> the unicast and multicast routing.					Cognitive		Understand		
						Psychomotor		Response		
<b>CO4</b>	<i>Match</i> and <i>Show</i> the protocol for real time applications.					Cognitive		Remember		
						Psychomotor		Set		

<b>CO5</b>	<i>Analyze</i> the protocols of application layer and <i>Design</i> a simple network.	Cognitive Psychomotor	Analyze Origination	
<b>UNIT I</b>	<b>NETWORK FUNDAMENTALS AND PHYSICAL LAYER</b>		<b>12+6</b>	
Introduction – Data Communications – Networks – Network Types – Internet History – Standards and Administration - Network Models – Protocol Layering – TCP/IP Protocol Suite – The OSI Model – Transmission Media – Switching.				
<b>UNIT II</b>	<b>DATA LINK LAYER</b>		<b>12+6</b>	
Introduction to Data Link Layer – Link Layer Addressing - Error Detection and Error Correction - Data Link Control - MAC – Wired LANs: Ethernet - Wireless LANs – Other Wireless Networks - Connecting Devices and Virtual LANs.				
<b>UNIT III</b>	<b>NETWORK LAYER</b>		<b>12+6</b>	
Introduction to Network Layer – Network Layer Protocols – Unicast Routing – Multicast Routing.				
<b>UNIT IV</b>	<b>TRANSPORT LAYER</b>		<b>12+6</b>	
Introduction to Transport Layer – Transport Layer Protocols – User Datagram Protocol – Transmission Control Protocol – SCTP.				
<b>UNIT V</b>	<b>APPLICATION LAYER AND SECURITY</b>		<b>12+6</b>	
Introduction to Application Layer – Standard Client Server Protocols – Multimedia – WWW and HTTP – FTP – Electronic Mail – TELNET – DNS.				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>
<b>60</b>	<b>30</b>	<b>0</b>	<b>0</b>	<b>90</b>
<b>TEXT BOOKS:</b>				
1. Behrouz A. Forouzan, “Data Communications and Networking”, Fifth Edition, McGraw Hill Education, 2013.				
<b>REFERENCES:</b>				
1. Achyut S Godbole, Atul Hahate, “Data Communications and Networks”, Second Edition, New Delhi: Tata McGraw-Hill Education, 2011.				

2. Andrew S. Tanenbaum, David J. Wetherall “Computer Networks”, Fifth Edition, Pearson Education Inc., 2013.
3. William Stallings, “Data and Computer Communications”, Tenth Edition, Pearson Education, 2014.

### E-REFERENCES

1. Video Lecture Link:  
[http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e\\_videonotes/tanenbaum\\_videoNotes.html](http://media.pearsoncmg.com/ph/streaming/esm/tanenbaum5e_videonotes/tanenbaum_videoNotes.html)
2. Lecture Slides, Multiple Choice Questions, Animations Link:  
[http://highered.mheducation.com/sites/0072967757/student\\_view0/index.html](http://highered.mheducation.com/sites/0072967757/student_view0/index.html)
3. Lecture Slides: <http://www.mhhe.com/engcs/compsci/forouzan/>

### Mapping of Course Outcomes (CO) with Programme Outcomes (PO):

B.Sc.	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	1	1	0	1	0	1	1
CO2	0	1	3	2	0	2	0	2	2
CO3	1	2	3	0	0	2	0	2	2
CO4	1	2	3	1	0	2	0	1	2
CO5	0	3	0	1	0	2	0	1	2
Average	1	2	2	1	0	2	0	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XBC503A			.NET TECHNOLOGIES				L	T	P	S	C
							3	2	1	0	6
C	P	A					L	T	P	S	H
2.8	1	0.2					3	2	3	0	8

<b>PREREQUISITE:</b> Nil			
<b>COURSE OUTCOMES:</b>			
<b>Course Outcomes</b>		<b>Domain</b>	<b>Level</b>
After the completion of the course, students will be able to			
<b>CO1</b>	<i>Recognize</i> the basics of .net frame work	Cognitive Psychomotor	Remember Perception
<b>CO2</b>	<i>Express</i> and <i>relate</i> decision and iteration control structures to implement programs	Cognitive Psychomotor	Understand Perception
<b>CO3</b>	<i>Predict</i> and <i>Create</i> database connection and <i>manipulate</i> the data source	Cognitive Psychomotor	Understand Create Guided Response
<b>CO4</b>	<i>Choose</i> and <i>Apply</i> controls and <i>reproduce</i> well-structured .NET applications	Cognitive Psychomotor	Remember Apply Guided Response
<b>CO5</b>	<i>Construct</i> and <i>demonstrate</i> various real-world applications in ASP.NET with C#	Cognitive Psychomotor Affective	Create Mechanism Valuing
<b>UNIT I</b>	<b>INTRODUCTION TO .NET FRAMEWORK</b>		<b>9+6+9</b>
Managed Code and the CLR- Intermediate Language, Metadata and JIT Compilation – Automatic Memory Management- Visual Studio .NET – Using the .NET Framework- The Framework Class Library- .NET objects – ASP .NET - .NET web services – Windows Forms			
<b>Lab:</b> 1.Familiarizing with .NET Environment.			
<b>UNIT II</b>	<b>INTRODUCTION TO C#.NET</b>		<b>9+6+9</b>
Variables and constants – data types – declaration. Operators – types – precedence. Expressions. Program flow – Decision statements – Loop statements – Value data types – Structures, Enumerations. Reference			

data types- Single dimensional – Multi-dimensional arrays – jagged arrays – dynamic arrays Windows programming– creating windows Forms – windows controls –Events. Menus and Dialog Boxes– Creating menus – menu items – context menu – Using dialog boxes – showDialog () method.

**Lab:** 1. Work with Console

2. Looping and Conditional Statements
3. Working with various Controls such as timer, calendar, etc.,
4. Create basic text editor

<b>UNIT III</b>	<b>APPLICATION DEVELOPMENT USING ADO .NET</b>	<b>9+6+9</b>
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Architecture of ADO.NET – ADO.NET providers – Connection – Command – Data Adapter – Dataset. Accessing Data with ADO.NET - Connecting to Data Source, Accessing Data with Data set and Data Reader - Create an ADO.NET application - Using Stored Procedures.

**Lab:**

1. Insert, Delete, Update and Modify Operations
2. Store and retrieve data using Data Grids

<b>UNIT IV</b>	<b>INTRODUCTION TO ASP.NET</b>	<b>9+6+9</b>
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ASP.NET Features: Change the Home Directory in IIS - Add a Virtual Directory in IIS Set a Default Document for IIS - Change Log File Properties for IIS - Stop, Start, or Pause a Web Site. Web Controls - HTML Controls, Using Intrinsic Controls, Using Input Validation Controls, Selecting Controls for Applications - Adding web controls to a Page. Server Controls - Types of Server Controls - Adding ASP.NET Code to a Page.

**Lab:**

1. Working with various Controls
2. Using stored Procedures
3. Form Creation with HTML

<b>UNIT V</b>	<b>APPLICATIONS OF ASP.NET WITH C#</b>	<b>9+6+9</b>
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Windows Application: Creation of Media Player. Web Applications: Job Portal, E-mail and SMS Server, Online food ordering System.

**Lab:**

1. Real Time Projects

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
45	30	45	0	120

**TEXTBOOKS**

1. David Chappell, "Understanding .NET", 2nd Edition, Addison-Wesley Professional, 2006.
2. Andrew Troelsen, Phil Japikse, "Pro C# 7 With .NET and .NET Core", Apress, 2017.
3. Matthew Macdonald, "ASP.NET: The Complete Reference", McGraw Hill Education, 2017.

**REFERENCES**

1. Herbert Schildt, "C# 4.0 The Complete Reference", McGraw-Hill Education, 2010.
2. Marino Posadas, "Mastering C# and .NET Framework", Packt Publishing, 2016.
3. Paul Deitel and Harvey Deitel, "Visual C# How to Program", Prentice Hall; Pearson Education Limited; 6th edition (2017).

**E-REFERENCES**

1. [www.tutorialspoint.com](http://www.tutorialspoint.com)
2. [www.microsoft.com/net](http://www.microsoft.com/net)
3. [www.w3schools.com/aspnet](http://www.w3schools.com/aspnet)

**COs versus POs mapping**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	3				1		1		
<b>CO2</b>	2	2	1	2	3	0	2	1	
<b>CO3</b>	2	3	2	2	3	1	2	2	
<b>CO4</b>	2	3	2	2	3	0	2	2	3
<b>CO5</b>	1	3	3	2	3	1	2	3	2
<b>Total</b>	10	11	8	10	13	2	9	8	5
<b>Scaled Value</b>	2	3	2	2	3	1	2	2	1

1-5 → 1, 6-10 → 2, 11-15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC503B</b>			<b>GIMP(GNU IMAGE MANIPULATION PROGRAM)</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>C</b>
								<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>6</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>H</b>
<b>2.5</b>	<b>0.5</b>	<b>0</b>						<b>3</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>8</b>
<b>PREREQUISITE:</b> Basics of colors												
<b>Course Outcomes</b>						<b>Domain</b>			<b>Level</b>			
After the completion of the course, students will be able to												
<b>CO1</b>	<b>Recognize</b> the importance of Imaging Concepts and Graphic Formats.					<b>Cognitive</b> <b>Psychomotor</b>			<b>Remember</b> <b>Perception</b>			
<b>CO2</b>	<b>Express</b> the functionalities of each Capturing and Creating Images.					<b>Cognitive</b>			<b>Understand</b>			
<b>CO3</b>	<b>Employ</b> the understanding of the various Grid Properties.					<b>Cognitive</b>			<b>Apply</b>			
<b>CO4</b>	<b>Utilize</b> the Image Manipulations.					<b>Cognitive</b>			<b>Apply</b>			

<b>CO5</b>	<b>Design and Establish</b> the Creating and Drawing tools.		Cognitive Psychomotor	Create Set
<b>UNIT I</b>				<b>9+6+9</b>
Imaging Concepts and Graphic Formats: Pixel, Resolution, File Size, Image Compression, Raster & Vector Images, Color Model.				
<b>UNIT II</b>				<b>9+6+9</b>
Capturing and Creating Images: Saving Images, Scanning Images, Familiarization with GIMP Interface				
<b>UNIT III</b>				<b>9+6+9</b>
Settings: Foreground and Background Colors, Grid Properties.				
<b>UNIT IV</b>				<b>9+6+9</b>
Image Manipulations: Resizing images, cropping images, Moving and Copying images, Rotating and flipping images.				
<b>UNIT V</b>				<b>9+6+9</b>
Working with Text: Creating and editing text, Formatting Text, Applying text wraps. Tools: Drawing tools, Painting tools				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF - STUDY</b>	<b>TOTAL</b>
<b>45</b>	<b>30</b>	<b>45</b>	<b>-</b>	<b>120</b>
<b>REFERENCES:</b>				
1. Kay Richter, GIMP 2.8 - Buch (e-book)				
2. Olivier Lecarme and Karine Delvare, The Book of GIMP, A complete Guide to Nearly Everything, Kindle Edition				

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

<b>B.Sc CS</b>	<b>PO</b>	<b>PSO</b>
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	1	2	3	4	5	6	7	1	2
CO1	2	2	2	2	2	1	1	2	2
CO2	2	3	3	3	3	1	1	3	2
CO3	2	3	3	3	3	1	1	3	2
CO4	2	3	3	3	3	1	1	3	2
CO5	2	3	3	3	3	1	1	3	2
Average	2	3	3	3	3	1	1	3	2

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

XBC503C			THEORY OF COMPUTATION					L	T	P	S	C
								3	2	1	0	6
C	P	A						L	T	P	S	C
2.5	0.5	0						3	2	3	0	8
PREREQUISITE: XBC103, XBC301												
COURSE OUTCOMES							DOMAIN		LEVEL			
After the completion of the course, students will be able to												
CO1	Recognize the significance of Web Technology.						Cognitive		Remember			
							Psychomotor		Perception			
CO2	Express the knowledge on HTML, CSS and JavaScript and PHP in Web Design.						Cognitive		Understand			
CO3	Employ the understanding of the Client and Server-side scripts and actively <i>participate</i> in teams for the creation of static and dynamic web pages.						Cognitive		Apply			
							Affective		Respond			
CO4	Utilize the web designing tools effectively in the real-world applications.						Cognitive		Apply			

<b>CO5</b>	<b><i>Design and Establish</i> the Website or Web based Software.</b>	Cognitive Psychomotor	Create Set
<b>UNIT I</b>			<b>9+3+9</b>
Automata: Introduction to Formal Proof, Additional Forms of Proof, Inductive Proofs, Finite Automata (FA), Deterministic Finite Automata (DFA), Non-Deterministic Finite Automata (NFA), Finite Automata with Epsilon Transitions.			
<b>Lab:</b>			
Language of Binary strings which ends with the pattern 101.			
<b>UNIT II</b>			<b>9+3+9</b>
Regular Expressions and Languages: Regular Expression, FA and Regular Expressions, Proving Languages not to be Regular, Closure Properties of Regular Languages, Equivalence and Minimization of Automata.			
<b>Lab:</b>			
Language of Binary strings such that the third symbol from the end is a Zero.			
<b>UNIT III</b>			<b>9+3+9</b>
Context Free Grammars and Languages: Context Free Grammar (CFG), Parse Trees, Ambiguity in Grammars and Languages, Definition of The Pushdown Automata, Languages of a Pushdown Automata, Equivalence of Pushdown Automata and CFG Deterministic Pushdown Automata.			
<b>Lab:</b>			
Language of parenthesized expressions with matching left and right parenthesis.			
<b>UNIT IV</b>			<b>9+3+9</b>
Properties of Context Free Languages: Normal Forms for CFG, Pumping Lemma for CFL, Closure Properties of CFL, Turing Machines, Programming Techniques for TM, Variations of TM, Non-Universal TM, Universal TM.			
<b>Lab:</b>			

Language of Binary strings with equal number of Zeros and Ones.				
<b>UNIT V</b>			<b>9+3+9</b>	
Undecidability: A Language that is not Recursively Enumerable (RE), an Undecidable Problem that is RE, Undecidable Problems about Turing Machine, Post's Correspondence Problem, The Classes P and NP.				
<b>Lab:</b>				
Language generated by the grammar $\{a^n b^n c^n \mid n \geq 1\}$				
Language $\{a^p \mid p \text{ is prime}\}$				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF-STUDY</b>	<b>TOTAL</b>
<b>45</b>	<b>30</b>	<b>45</b>	<b>0</b>	<b>120</b>
<b>TEXT BOOKS:</b>				
<ol style="list-style-type: none"> <li>1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.</li> <li>2. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.</li> </ol>				

**Table 1: Mapping of COs with Pos**

Course Outcomes	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	2	0	1	1	0	1	0	1	2
<b>CO2</b>	2	2	2	1	1	0	1	2	3
<b>CO3</b>	1	2	2	1	2	1	1	2	3
<b>CO4</b>	0	1	2	2	2	1	0	2	3
<b>CO5</b>	1	2	3	2	3	2	1	3	3
<b>Average</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>3</b>

1-5 → 1, 6-10 → 2, 11-15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC504A</b>			<b>IMAGE PROCESSING</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>C</b>
								<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>6</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>H</b>
<b>2.5</b>	<b>0.5</b>	<b>0</b>						<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>6</b>
<b>PREREQUISITE:</b>												
<b>COURSE OUTCOMES</b>						<b>DOMAIN</b>			<b>LEVEL</b>			
After the completion of the course, students will be able to												
<b>CO1</b>	<b>Recognize</b> the significance image fundamentals and mathematical transforms necessary for image processing.					Cognitive			Remember			
<b>CO2</b>	<b>Express</b> the knowledge on image enhancement techniques					Cognitive			Understand			
<b>CO3</b>	<b>Employ</b> and understand the image restoration and reconstruction procedures					Cognitive			Apply			
<b>CO4</b>	<b>Utilize</b> and exploit the image segmentation procedures.					Cognitive			Apply			
<b>CO5</b>	<b>Recognize</b> thecolor models.					Cognitive			Create			
<b>UNIT I</b>			<b>DIGITAL IMAGE FUNDAMENTALS</b>						<b>12+6</b>			
Digital Image Fundamentals: Elements of Visual Perception, Light, Brightness Adaption and Discrimination, Image Sensing and Acquisition, Image Sampling and Quantization, Pixels, Some Basic Relationships between Pixels, Coordinate Conventions, Imaging Geometry, Perspective Projection, Linear and Nonlinear Operations.												

<b>UNIT II</b>	<b>IMAGE ENHANCEMENT</b>			<b>12+6</b>
Image Enhancement in the Spatial Domain: Intensity transformations, Contrast Stretching, Histogram Equalization, Correlation and Convolution, Basics of Spatial Filtering, Smoothing Filters, Sharpening Filters, Gradient and Laplacian.				
<b>UNIT III</b>	<b>FILTERING IN THE FREQUENCY DOMAIN</b>			<b>12+6</b>
Filtering in the Frequency domain: Hotelling Transform, Fourier Transforms and properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Convolution, Correlation, 2 -D sampling, Discrete Cosine Transform, Frequency domain filtering.				
<b>UNIT IV</b>	<b>IMAGE RESTORATION AND RECONSTRUCTION</b>			<b>12+6</b>
Image Restoration and Reconstruction: Basic Framework, Interactive Restoration, Image deformation and geometric transformations, imagemorphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Estimation of Degradation functions, Restoration from projections.				
<b>UNIT V</b>	<b>COLOR IMAGE PROCESSING</b>			<b>12+6</b>
Color Image Processing, Color Fundamentals, Color Models, Pseudo color Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation. Morphological Image Processing, Dilation and Erosion, Opening and Closing., Extensions to Gray -Scale Images. Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation, Segmentation by Morphological Watersheds.				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF-STUDY</b>	<b>TOTAL</b>
<b>60</b>	<b>30</b>	<b>0</b>	<b>0</b>	<b>90</b>
<b>TEXT BOOKS:</b>				
1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, 4th Edition, Prentice Hall.				
<b>REFERENCES:</b>				
1. Anil K. Jain, Fundamentals of Digital Image Processing, Prentice Hall.				

2. Stan Birchfield, Image Processing and Analysis, Cengage Learning.

**E-REFERENCES:**

[https://www.tutorialspoint.com/image processing/](https://www.tutorialspoint.com/image_processing/)

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc.	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	1	1	0	1	0	1	1
CO2	0	1	3	2	0	2	0	2	2
CO3	1	2	3	0	0	2	0	2	2
CO4	1	2	3	1	0	2	0	1	2
CO5	0	3	0	1	0	2	0	1	2
Average	1	2	2	1	0	2	0	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC504B</b>			<b>INTERNET TECHNOLOGIES</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>C</b>
								<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>6</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>S</b>	<b>H</b>
<b>2.5</b>	<b>0.5</b>	<b>0</b>						<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>6</b>
<b>PREREQUISITE:</b> Computer Networks												
<b>Course Outcomes</b>							<b>Domain</b>	<b>Level</b>				
After the completion of the course, students will be able to												
<b>CO1</b>	<b>Identify</b> the terms related to the Internet and how the Internet is changing the world.						<b>Cognitive</b>		<b>Remember</b>			

		Psychomotor	Perception
<b>CO2</b>	<b>Design</b> and connected to the Internet and demonstrate the ability to use the World Wide Web	Cognitive	Create
<b>CO3</b>	<b>Perceive</b> the significance electronic mail and other internet-based services.	Cognitive Psychomotor	Create Perception
<b>CO4</b>	<b>Recognize</b> the design principles of the web pages and how they are created.	Cognitive	Create
<b>CO5</b>	<b>Combine the</b> needed internet resources and implement in the business model	Cognitive	Analyze
<b>UNIT I</b>	<b>INTRODUCTION</b>		<b>12+6</b>
Introduction: Overview, Network of Networks, Intranet, Extranet and Internet. World Wide Web, Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. Review of TCP/IP: Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control.			
<b>UNIT II</b>	<b>IP DATAGRAM</b>		<b>12+6</b>
IP Datagram, IPv4 and IPv6. IP Subnetting and addressing: Classful and Classless Addressing, Subnetting. NAT, IP masquerading, IP tables. Internet Routing Protocol: Routing -Intra and Inter Domain Routing, Unicast and Multicast Routing, Broadcast. Electronic Mail: POP3, SMTP.			
<b>UNIT III</b>	<b>HTML INTRODUCTION</b>		<b>12+6</b>
HTML: Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Color name, Color value. Image Maps: map, area, attributes of image area. Extensible Markup Language (XML): Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts: Introduction, Environment Variable, GET and POST Methods			
<b>UNIT IV</b>	<b>PERL INTRODUCTION</b>		<b>12+6</b>
PERL: Introduction, Variable, Condition, Loop, Array, Implementing data structure, Hash, String, Regular Expression, File handling, I/O handling. JavaScript: Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object - string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies: Definition of cookies, Create and Store a cookie with example. Java Applets: Container Class, Components, Applet Life Cycle, Update method; Parameter passing applet, Applications.			
<b>UNIT V</b>	<b>CLIENT- SERVER PROGRAMMING</b>		<b>12+6</b>
Client-Server programming In Java: Java Socket, Java RMI. Threats: Malicious code-viruses, Trojan horses, worms; eavesdropping, spoofing, modification, denial of service attacks. Network security			

techniques: Password and Authentication; VPN, IP Security, security in electronic transaction, Secure Socket Layer (SSL), Secure Shell (SSH). Firewall: Introduction, Packet filtering, Stateful, Application layer, Proxy.

Internet Telephony: Introduction, VoIP. Multimedia Applications: Multimedia over IP: RSVP, RTP, RTCP and RTSP. Streaming media, Codec and Plugins, IPTV. mywbut.com Search Engine and Web Crawler: Definition, Meta data, Web Crawler, Indexing, Page rank, overview of SEO.

LECTURE	TUTORIAL	PRACTICAL	SELF-STUDY	TOTAL
60	30	-	-	90

**REFERENCES:**

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI, Learning, Delhi, 2013.
2. Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011.

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	1	2	2	1	1	0	0	1	2
CO2	1	3	1	2	2	0	1	2	2
CO3	0	3	1	2	2	1	1	2	2
CO4	0	3	0	2	2	0	1	2	2
CO5	0	3	2	1	3	1	1	3	2
Average	1	2	1	2	2	1	1	2	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC504C</b>	<b>SYSTEM SECURITY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
		<b>4</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>6</b>



C	P	A	L	T	P	SS	H
3	0	0	4	2	0	0	6
<b>PREREQUISITE:</b> XBC103, XBC402							
<b>Course Outcomes</b>			<b>Domain</b>	<b>Level</b>			
After the completion of the course, students will be able to							
<b>CO1</b>	<i>Understand</i> computer operating systems, distributed systems, networks and representative applications.		Cognitive	Remember			
<b>CO2</b>	<i>Identify the</i> distributed system attacks, defenses against them, and forensics to investigate the aftermath		Cognitive	Remember			
<b>CO3</b>	<i>Analyze</i> the basics of cryptography, how it has evolved, and some key encryption techniques used today.		Cognitive	Analyze			
<b>CO4</b>	<i>Recognize</i> the security policies.		Cognitive	Remember			
<b>CO5</b>	<i>Analyze</i> the malicious software and DOS attacks.		Cognitive	Analyze			
<b>UNIT I</b>	<b>CRYPTOGRAPHIC TOOLS</b>				<b>9+6</b>		
Cryptographic Tools- Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions, Public-Key Encryption, Digital Signatures and Key Management, Random and Pseudorandom Numbers, Practical Application: Encryption of Stored Data.							
<b>UNIT II</b>	<b>USER AUTHENTICATION</b>				<b>9+6</b>		
User Authentication- Means of Authentication, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, RemoteUser Authentication, Security Issues for User Authentication, Practical Application: An Iris Biometric System, Case Study: Security Problems for ATM Systems.							
<b>UNIT III</b>	<b>ACCESS CONTROL</b>				<b>9+6</b>		
Access Control- Access Control Principles, Subjects, Objects, and Access Rights, Discretionary Access Control, Example: UNIX File Access Control, Role - Based Access Control, Case Study: RBAC System for a Bank.							
<b>UNIT IV</b>	<b>DATABASE SECURITY</b>				<b>9+6</b>		

Database Security-The Need for Database Security, Database Management Systems, Relational Databases, Database Access Control, Inference, Statistical Databases, Database Encryption, Cloud Security.

<b>UNIT V</b>	<b>MALICIOUS SOFTWARE</b>	<b>9+6</b>
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Malicious Software-Types of Malicious Software (Malware), Propagation– Infected Content– Viruses, Propagation–Vulnerability Exploit–Worms, Propagation–Social Engineering–SPAM E-mail, Trojans, Payload–System Corruption, Payload–Attack Agent–Zombie, Bots, Payload– Information Theft– Keyloggers, Phishing, Spyware, Payload–Stealth–Backdoors, Rootkits,, Countermeasures,Denial-of-Service Attacks- Denial-of-Service Attacks, Flooding Attacks, Distributed Denial-of-Service Attacks, Application-Based Bandwidth Attacks, Reflector and Amplifier Attacks, Defenses Against Denial -of-Service Attacks, Responding to a Denial-of-Service Attack.

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>
<b>45</b>	<b>30</b>	<b>0</b>	<b>0</b>	<b>75</b>

**TEXTBOOKS:**

1. M. Stamp, “Information Security: Principles and Practice,” 2 st Edition, Wiley, ISBN: 0470626399, 2011.
2. M. E. Whitman and H. J. Mattord, “Principles of Information Security,” 4 st Edition, Course Technology, ISBN: 1111138214, 2011.
3. M. Bishop, “Computer Security: Art and Science,” Addison Wesley, ISBN: 0 -201- 44099-7, 2002.
4. G. McGraw, “Software Security: Building Security In,” Addison Wesley, ISBN: 0321356705, 2006

**REFERENCES:**

1. David J. Kruglinski, Inside Visual C++, Microsoft Press 1992.
2. Boar, B.H., Implementing Client / Server Computing ; A Strategic Perspectre, Mcraw Hill, 1993.
3. Bouce Elbert, Client / Server Computing, Artech. Press, 1994.
4. Alex Berson, Client / Server Architecture, McGraw Hill, 1996.

**E-REFERENCES:**

[fivedots.coe.psu.ac.th/~suthon/csw/01%20-%20Client%20Server%20Computing.pdf](http://fivedots.coe.psu.ac.th/~suthon/csw/01%20-%20Client%20Server%20Computing.pdf)  
[www.bcanotes.com/Download/DBMS/Rdbms/Client\\_Server%20Computing.pdf](http://www.bcanotes.com/Download/DBMS/Rdbms/Client_Server%20Computing.pdf)

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	1	1	2	1	1	1	1	2	1
CO2	1	2	1	1	1	1	1	2	1
CO3	1	1	2	1	1	1	1	2	1
CO4	1	2	1	1	1	1	1	1	1
CO5	1	1	3	2	1	1	2	1	1
Average	1	1	2	1	1	1	1	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XBC601A			WEB TECHNOLOGIES				
			L	T	P	S	C
			3	0	1	0	4
C	P	A	L	T	P	S	H
2	1	0	3	0	2	0	5
<b>PREREQUISITE:</b> Software Engineering							
<b>Course Outcomes</b>					<b>Domain</b>	<b>Level</b>	
After the completion of the course, students will be able to							
<b>CO1</b>	<i>Recognize</i> the significance of Web Technology.				Cognitive Psychomotor	Remember Perception	
<b>CO2</b>	<i>Express</i> the knowledge on HTML, CSS and JavaScript and PHP in Web Design.				Cognitive	Understand	

<b>CO3</b>	<b>Employ</b> the understanding of the Client and Server-side scripts and actively <i>participate</i> in teams for the creation of static and dynamic web pages.	Cognitive Affective	Apply Respond
<b>CO4</b>	<b>Utilize</b> the web designing tools effectively in the real world applications.	Cognitive	Apply
<b>CO5</b>	<b>Design</b> and <b>Establish</b> the Website or Web based Software.	Cognitive Psychomotor	Create Set
<b>UNIT I</b>	<b>INTRODUCTION TO WEB TECHNOLOGY &amp; HTML</b>		<b>9+6</b>
Introduction to Web Technology – Concept of Tier – Web Pages – Static Web Pages – Dynamic Web Pages – HTML Basics – HTML CSS – Links – Images – Tables – Lists - Frames - HTML forms and Input tags.			
<b>Lab:</b>			
1. Formatting tags, ordered list and unordered list.			
2.Tables, frame, image map and hyperlink.			
<b>UNIT II</b>	<b>CSS &amp; JAVASCRIPT</b>		<b>9+6</b>
CSS Basics – Texts and Fonts – Links, Lists and Tables – Border and Outline – Position – Dimension and Display - Java Script Basics – Functions – Events – Conditional and Looping Statements – Forms.			
<b>Lab:</b>			
1.Font, color and style			
2. Background and Links			
3.Form Validation			
4.Looping and Conditional Statements			
<b>UNIT III</b>	<b>PHP BASIC CONCEPTS</b>		<b>9+6</b>
PHP - Basic Syntax – Data Types – Variables & Constants in PHP - String and Operators - Selective and Iterative flow of controls - PHP arrays & types - PHP function declaration - adding parameters - Server side includes - Built in functions			

**Lab:**

1. Strings and Operators
2. Flow of controls and Arrays
3. PHP Forms
4. PHP Functions

<b>UNIT IV</b>	<b>PHP ADVANCED CONCEPTS</b>	<b>9+6</b>
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PHP File Handling - Opening a File - Closing a File - Check End-Of-File - Reading a File Line By Line - Reading File Character By Character - PHP File Upload - Exception Handling - Creating Custom Exception Class - Re-Throwing Exceptions - Cookies - Sessions - E-Mails

**Lab:**

1. File Handling
2. Exception Handling
3. PHP Sessions and Cookies

<b>UNIT V</b>	<b>PHP &amp; MySQL</b>	<b>9+6</b>
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MySQL Database – Connect – Create DB – Create Table – Insert Data – Get Last ID – Insert Multiple - Select Data – Delete Data – Update Data – Limit Data

**Lab:**

PHP with MySQL

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
<b>45</b>	<b>0</b>	<b>30</b>	<b>-</b>	<b>75</b>

**TEXT BOOKS**

1. Achyut S. Godbole, Atul Kahate, "Web Technologies TCP/IP To Internet Application Architectures", First Edition, Tata McGraw-Hill Publishing Company Limited, 2003.
2. Elizabeth Castro, Bruce Hyslop, "HTML 5 and CSS 3", Eight Edition, Peachpit Press, 2015.
3. Thomas A. Powell, Fritz Schneider, "JavaScript: The Complete Reference", Second Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2008.
4. Kevin Tatroe, Peter MacIntyre and Rasmus Lerdorf, "Programming PHP", Third Edition, O'Reilly Media, Inc., 2015.

**REFERENCES:**

1. N.P. Gopalan, J.Akilandeswari, “Web Technology: A Developer’s Perspective”, Second Edition, PHI Learning Private Limited, 2014.
2. Thomas A. Powell, “HTML & CSS: The Complete Reference”, Fifth Edition, Tata McGraw Hill Education Private Limited, New Delhi, 2010.

**E-REFERENCES:**

1. [www.php.net/manual/en/intro-what-is.php](http://www.php.net/manual/en/intro-what-is.php)
2. [www.w3schools.com](http://www.w3schools.com)
3. [www.tutorialspoint.com](http://www.tutorialspoint.com)

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

1-5 → 1, 6-10 → 2, 11-15 → 3

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC601B</b>			<b>MOBILE APPLICATION AND DEVELOPMENT</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
								<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>						<b>3</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>5</b>
<b>PREREQUISITE: Fundamentals of Computer</b>												

Course Outcomes		Domain	Level
After the completion of the course, students will be able to			
CO1	<b>Recognize</b> the significance of Android platform and its architecture	Cognitive	Remember
CO2	<b>Summarize</b> the knowledge on java, xml with android and <b>detect</b> about the android development.	Cognitive Psychomotor	Understand Perception
CO3	<b>Manipulate</b> and utilize the layout, resources and user interface.	Cognitive Affective	Application Receiving
CO4	To <b>know</b> about the database in android	Cognitive	Understand
CO5	<b>Design</b> and test the android environment using exception handling, accessing thecloud data.	Cognitive	Create
<b>UNIT I</b>	<b>INTRODUCTION</b>		<b>9+6</b>
(Introduction) What is Android, Android Versions and its Feature Set, Various Android Devices on the Market, Android Market Application Store, Android Development Environment System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs).			
<b>Lab:</b>			
1. Installing Android			
2. Create a simple application			
<b>UNIT II</b>	<b>ANDROID ARCHITECTURE OVERVIEW AND APPLICATION</b>		<b>9+6</b>
Android Software Stack, The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, Dalvik VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework, Creating a New Android Project ,Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Example Application, Reviewing the Layout and Resource Files.			

**Lab:**

1. Working with fragments
2. Working with Intents and intent filters.
3. Creating contact based application.

**UNIT III****ANDROID SOFTWARE DEVELOPMENT  
PLATFORM AND FRAMEWORK****9+6**

Understanding Java SE and the Dalvik Virtual Machine, The Directory Structure of an Android Project, Common Default Resources Folders, The Values Folder, Leveraging Android XML, Screen Sizes , Launching Mobile Application: The AndroidManifest.xml File, Android Application Components, Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components, Android Manifest XML: Declaring Your Components.

**Lab:**

1. Working with views
2. Creating Dialogs and toasts
3. Working with Pop-up Menu

**UNIT IV****UNDERSTANDING ANDROID USER  
INTERFACES, VIEWS AND LAYOUTS****9+6**

Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool Displaying Text with TextView, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users, Adjusting Progress with Seek Bar, Working with Menus using views, Gallery, Image Switcher, Grid View, and Image View views to display images, Creating Animation.

**Lab:** 1. Quotes provider app

2. SQLite database app

3. Implement notification

**UNIT V****DATABASES, INTENTS, LOCATION-BASED  
SERVICES****9+6**



Saving and Loading Files, SQLite Databases, Android Database Design, Exposing Access to a Data Source through a Content Provider, Content Provider Registration, Native Content Providers Intents and Intent Filters: Intent Overview, Implicit Intents, Creating the Implicit Intent Example Project, Explicit Intents, Creating the Explicit Intent Example Application, Intents with Activities, Intents with Broadcast Receivers. Sending SMS Messages Programmatically, Getting Feedback after Sending the Message Sending SMS Messages Using Intent Receiving, sending email, Introduction to location-based service, configuring the Android Emulator for Location -Based Services, Geocoding and Map-Based Activities Multimedia: Audio, Video, Camera: Playing Audio and Video, Recording Audio and Video, Using the Camera to Take and Process Pictures.

**Lab:**

1. Working with exception handling
2. Finding your location using GPS.
3. Bluetooth communication / SMS communication

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
45	0	30	-	75

**TEXT BOOK**

1. Android Programming Unleashed (1st Edition) by Harwani.
2. Beginning Mobile Application Development in the Cloud (2011), Richard Rodger

**REFERENCES:**

1. Professional Android 4 Application Development, 3<sup>rd</sup> edition, reto meier, wiley publication 2012.
2. Programming Android, 1st Edition, [Zigurd Mednieks](#), [Laird Dornin](#), [G. Blake Meike](#), [Masumi Nakamura](#), Oreilly publications, 2011.

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

	PO	PSO

M.Sc. SE	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	2	1	1	1
CO2	3	2	2	2	2	2	2	2	1
CO3	2	2	2	2	3	2	2	2	1
CO4	3	2	2	2	2	2	2	3	1
CO5	3	3	3	3	3	3	3	3	1
Average	3	2	2	2	2	2	2	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XBC601C			CLOUD COMPUTING					L	T	P	SS	C
								3	0	1	0	4
C	P	A						L	T	P	SS	H
3	0	0						3	0	2	0	5
<b>PREREQUISITE:</b> Fundamentals of Computer												
<b>Course Outcomes</b>						<b>Domain</b>			<b>Level</b>			
After the completion of the course, students will be able to												
CO1	<i>Recognize</i> the importance of cloud computing behind all communications and day to day life activities.					Cognitive Psychomotor			Remember Perception			
CO2	<i>Express</i> the functionalities of each cloud services and aware of the various cloud service providers					Cognitive			Understand			
CO3	<i>Employ</i> the understanding of the various scheduling activities and actively <i>participate</i> in terms for the creation of various cloud services.					Cognitive			Apply Respond			

CO4	<i>Utilize</i> the cloud services tools effectively in the real world applications.	Cognitive	Apply
CO5	<i>Design</i> and <i>Establish</i> the cloud services and cloud storage	Cognitive Psychomotor	Create Set
<b>UNIT I</b>	<b>INTRODUCTION TO CLOUD COMPUTING</b>		<b>9+6</b>
<p>Definition, characteristics, components, Cloud service provider, the role of networks in Cloud computing, Cloud deployment models- private, public &amp; hybrid, Cloud service models, multitenancy, Cloud economics and benefits, Cloud computing platforms - IaaS: Amazon EC2, PaaS: Google App Engine, Microsoft Azure, SaaS.</p> <p><b>Lab:</b></p> <ol style="list-style-type: none"> <li>1.Install Virtualbox /VMware Workstation with different flavours of linux or windows OS with virtualization support</li> <li>2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs</li> </ol>			
<b>UNIT II</b>	<b>VIRTUALIZATION</b>		<b>9+6</b>
<p>Virtualization concepts , Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, VMware hypervisors and their features.</p> <p><b>Lab:</b></p> <ol style="list-style-type: none"> <li>1.Install Google App Engine. Create hello world app and other simple web applications using python/java.</li> </ol>			
<b>UNIT III</b>	<b>DATA IN CLOUD COMPUTING</b>		<b>9+6</b>
<p>Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. MapReduce and extensions: Parallel computing, the map-Reduce model, Parallel efficiency of MapReduce, Relational operations using Map-Reduce, Enterprise batch processing using MapReduce.</p> <p><b>Lab:</b></p> <ol style="list-style-type: none"> <li>1.Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.</li> </ol>			

<b>UNIT IV</b>	<b>CLOUD SECURITY</b>			<b>9+6</b>
<p>Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud. Cloud computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro - architectures; Identity Management and Access control, Autonomic security, Security challenges : Virtualization security management - virtual threats, VM Security Recommendations, VM - Specific Security techniques, Secure Execution Environments and Communications in cloud.</p> <p><b>Lab:</b></p> <ol style="list-style-type: none"> <li>1. Experiment a procedure to transfer the files from one virtual machine to another virtual machine.</li> <li>2. Experiment a procedure to launch virtual machine using trystack (Online Openstack Demo Version)</li> </ol>				
<b>UNIT V</b>	<b>ISSUES IN CLOUD COMPUTING</b>			<b>9+6</b>
<p>Implementing real time application over cloud platform, Issues in Inter -cloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring.</p> <p><b>Lab:</b></p> <ol style="list-style-type: none"> <li>1. Install Hadoop single node cluster and run simple applications like word count</li> </ol>				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>
<b>45</b>	<b>0</b>	<b>30</b>	<b>-</b>	<b>75</b>
<b>TEXT BOOK</b>				
<ol style="list-style-type: none"> <li>1. System Analysis and Design – Awadh</li> <li>2. Analysis &amp; Design of Information system – James A. Senn –McGraw Hill</li> </ol>				

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	1	1	2	1	1	1	1	2	1
CO2	1	2	1	1	1	1	1	2	1
CO3	1	1	2	1	1	1	1	2	1
CO4	1	2	1	1	1	1	1	1	1
CO5	1	1	3	2	1	1	2	1	1
Average	1	1	2	1	1	1	1	2	1

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

XBC602A			INTERNET OF THINGS					L	T	P	SS	C
								4	0	0	2	6
C	P	A						L	T	P	SS	H
3	0	0						4	0	0	2	6
<b>PREREQUISITE:</b> Fundamentals of Computer												
<b>Course Outcomes</b>							<b>Domain</b>		<b>Level</b>			
After the completion of the course, students will be able to												
CO1	<i>Identify</i> the components of IOT and learn the basic issues, policy and challenges in the Internet						Cognitive Psychomotor		Remember Perception			
CO2	<i>Design</i> the portable device, program the sensors and microcontrollers						Cognitive		Create			
CO3	<i>Perceive</i> the significance of <i>building</i> the software agents in the real time environments						Cognitive Psychomotor		Create Perception			
CO4	<i>Formulate</i> and <i>Establish</i> the cloud-based communication through wi Fi/ Bluetooth						Cognitive Psychomotor		Create Set			

<b>CO5</b>	<i>Combine the</i> needed internet resources and implement in the business model	Cognitive	Analyze	
<b>UNIT I</b>	<b>INTRODUCTION TO IOT, SENSORS AND ACTUATORS</b>		<b>12</b>	
Introduction to IoT: Definition, Characteristics, Applications, Evolution, Enablers, Connectivity Layers, Addressing, Networking and Connectivity Issues, Network Configurations, Multi -Homing, Sensing: Sensors and Transducers, Classification, Different Types of Sensors, Errors, Actuation: Basics, Actuator Types- Electrical, Mechanical Soft Actuators				
<b>UNIT II</b>	<b>INTRODUCTION TO NETWORKING</b>		<b>12</b>	
Basics of Networking, Communication Protocols, Sensor Network, Machine to Machine Communication (IoT Components, Inter-Dependencies, SoA, Gateways, Comparison Between IoT & Web, Difference Protocols, Complexity of Networks, Wireless Networks, Scalability, Protocol Classification, MQTT & SMQTT, IEEE 802.15.4, Zigbee)				
<b>UNIT III</b>	<b>ARDUINO PROGRAMMING</b>		<b>12</b>	
Interoperability in IoT, Introduction to Arduino Programming, Integration Of Sensors And Actuators With Arduino				
<b>UNIT IV</b>	<b>PYTHON PROGRAMMING</b>		<b>12</b>	
Introduction to Python Programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi, Implementation of IoT with Raspberry Pi				
<b>UNIT V</b>	<b>DATA ANALYTICS</b>		<b>12</b>	
Data Handling and Analytics, Cloud Computing Fundamentals, Cloud Computing Service Model, Cloud Computing Service Management and Security, Sensor-Cloud Architecture, View and Dataflow. FOG Computing: Introduction, Architecture, Need, Applications and Challenges. Industrial IoT, Case Studies: Agriculture, Healthcare, Activity Monitoring.				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>
<b>60</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>60+30</b>
<b>TEXT BOOK</b>				
<ol style="list-style-type: none"> <li>1. The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press).</li> <li>2. Internet of Things: A Hands-on Approach", by A Bahga and Vijay Madiseti (Universities Press)</li> </ol>				
<b>REFERENCES:</b>				

1. Charalampos Doukas , Building Internet of Things with the Arduino, Create space, April 2002.
2. Dieter Uckelmann et.al, “Architecting the Internet of Things”, Springer, 2011 Luigi Atzor et.al, “The Internet of Things: A survey, “, Journal on Networks, Elsevier Publications, October, 2010
3. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011
4. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010
5. The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
6. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012

**E-REFERENCES**

1. <http://postscapes.com>
2. <http://www.theinternetofthings.eu/what-is-the-internet-of-things>

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	1	2	2	1	1	0	0	1	2
<b>CO2</b>	1	3	1	2	2	0	1	2	2
<b>CO3</b>	0	3	1	2	2	1	1	2	2
<b>CO4</b>	0	3	0	2	2	0	1	2	2
<b>CO5</b>	0	3	2	1	3	1	1	3	2
<b>Average</b>	1	2	1	2	2	1	1	2	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC602B</b>			<b>DATA MINING</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
								<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>						<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>PREREQUISITE: DBMS</b>												
<b>Course Outcomes</b>							<b>Domain</b>		<b>Level</b>			
After the completion of the course, students will be able to												
<b>CO1</b>	<i>Analyze</i> and Demonstrate advanced knowledge of data mining concepts and techniques						Cognitive		Analyze			
<b>CO2</b>	<i>Evaluate</i> and Apply the techniques of clustering, classification, association finding, feature selection and visualization on real world data various mining techniques on complex data objects						Cognitive		Evaluate			
<b>CO3</b>	<i>Understand and</i> Determine whether a real-world problem has a data mining solution						Cognitive		Understand			
<b>CO4</b>	<i>Choose and</i> Apply data mining software and toolkits in a range of applications						Cognitive Affective		Apply Respond			
<b>CO5</b>	<i>Recognize</i> and Set up a data mining process for an application, including data preparation, modelling and evaluation						Cognitive Psychomotor		Analyze Perception			
<b>UNIT I</b>	<b>INTRODUCTION TO DATA MINING</b>							<b>12</b>				
Introduction to Data Mining, Understanding Data, Relations to Database, Statistics, Machine Learning.												
<b>UNIT II</b>	<b>ASSOCIATION RULE MINING</b>							<b>12</b>				
Association Rule Mining, Level-wise Method, FP-Tree Method, Other Variants												
<b>UNIT III</b>	<b>CLASSIFICATION</b>							<b>12</b>				



Classification, Decision Tree Algorithm, CART, PUBLIC, Pruning Classification Tree.

<b>UNIT IV</b>	<b>CLUSTERING</b>	<b>12</b>
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Clustering Techniques, Clustering of Numeric Data, of Ordinal Data, Efficiency of Clustering, Consensus Clustering, Spectral Clustering.

<b>UNIT V</b>	<b>ROC ANALYSIS</b>	<b>12</b>
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Rough Set Theory and its Application to Data Mining, ROC Analysis, Data Mining Trends, Big Data, Data Analytics.

LECTURE	TUTORIAL	PRACTICAL	SELF STUDY	TOTAL
60	0	0	30	60+30

**TEXT BOOK**

1. Data Mining Techniques (4<sup>th</sup> Edition) Universities Press Arun K Pujari

**REFERENCES:**

1. Data Mining Introductory And Advanced Topics –Margaret H Dunham, Pearson Education

**E-REFERENCES:**

1. [http://www.tutorialspoint.com/data\\_mining](http://www.tutorialspoint.com/data_mining)
2. <http://www.dataminingconsultant.com/resources.html>

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	3	2	3	2	2	1	1	1	3
CO2	2	3	2	3	1	1	1	2	3
CO3	3	2	3	2	2	2	1	2	3
CO4	3	2	2	3	1	1	1	1	3
CO5	2	3	2	2	2	2	1	2	3

3–Strong Correlation, 2–Medium Correlation, 1–Low Correlation, 0–No Correlation

<b>XBC602C</b>			<b>ARTIFICIAL INTELLIGENCE</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
								<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>						<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>PREREQUISITE:</b> Data Structure												
<b>Course Outcomes</b>							<b>Domain</b>		<b>Level</b>			
After the completion of the course, students will be able to												
<b>CO1</b>	<i>Analyze</i> what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence						Cognitive		Analyze			

CO2	<i>Evaluate</i> AI methods, and which AI methods may be suited to solving a given problem.	Cognitive	Evaluate
CO3	<i>Understand</i> a given problem in the language/framework of different AI methods.	Cognitive	Understand
CO4	<i>Choose an</i> algorithm on a problem formalization, and state the conclusions that the evaluation supports.	Cognitive	Apply
CO5	<i>Recognize</i> the limitations of current Artificial Intelligence techniques	Cognitive	Analyze
<b>UNIT I</b>	<b>INTRODUCTION TO ARTIFICIAL INTELLIGENCE</b>		<b>12</b>
Introduction to Artificial Intelligence: Definition of AI; Turing Test; Brief History of AI. Problem Solving and Search: Problem Formulation; Search Space; States vs. Nodes; Tree Search: Breadth-First, UniformCost, Depth-First, Depth-Limited, Iterative Deepening; Graph Search.			
<b>UNIT II</b>	<b>INFORMED SEARCH</b>		<b>12</b>
Informed Search: Greedy Search; A* Search; Heuristic Function; Admissibility and Consistency; Deriving Heuristics via Problem Relaxation. Local Search: Hill -Climbing; Simulated Annealing; Genetic Algorithms; Local Search in Continuous Spaces. Playing Games: Game Tree; Utility Function; Optimal Strategies; MinimaxAlgorithm; Alpha-Beta Pruning; Games with an Element of Chance. Beyond Classical Search: Searching withNondeterministic Actions; Searching withPartial Observations; Online Search Agents; Dealing with Unknown Environments			
<b>UNIT III</b>	<b>PLAYING GAMES</b>		<b>12</b>
Knowledge Representation and Reasoning: Ontologies, Foundations of Knowledge Representation and Reasoning, Representing andReasoning about Objects, Relations, Events, Actions, Time, and Space; Predicate Logic, Situation Calculus, Description Logics, Reasoning with Defaults, Reasoning about Knowledge, Sample Applications. Representing and Reasoning with Uncertain Knowledge: Probability, Connection to Logic, Independence, Bayes Rule, Bayesian Networks, Probabilistic Inference, and Sample Applications.			
<b>UNIT IV</b>	<b>KNOWLEDGE REPRESENTATION AND REASONING</b>		<b>12</b>
Representing and Reasoning with Uncertain Knowledge: Probability, Connection to Logic, Independence, Bayes Rule, Bayesian Networks, Probabilistic Inference, and Sample Applications. Planning: The STRIPS Language; Forward Planning; Backward Planning; Planning Heuristics; Partial-Order Planning; Planning using Propositional Logic; Planning vs. Scheduling			

<b>UNIT V</b>	<b>CONSTRAINT SATISFACTION PROBLEMS</b>	<b>12</b>
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Constraint Satisfaction Problems (CSPs): Basic Definitions; Finite vs. Infinite vs.

Continuous Domains; Constraint Graphs; Relationship with Propositional Satisfiability, Conjunctive Queries, Linear Integer Programming, and Diophantine Equations; NP - Completeness of CSP; Extension to Quantified Constraint Satisfaction (QCSP). Constraint Satisfaction as a Search Problem; Backtracking Search; Variable and Value Ordering Heuristic; Degree Heuristic; Least-Constraining Value Heuristic; Forward Checking; Constraint Propagation; Dependency-Directed Backtracking;

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>
<b>60</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>60+30</b>

**TEXT BOOK**

Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, Third Edition, McGraw Hill Edition

**REFERENCES:**

Russell Stuart Jonathan and Norvig Peter, Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall, 2010

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

<b>B.Sc CS</b>	<b>PO</b>							<b>PSO</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>2</b>
<b>CO1</b>	2	1	1	1	1	1	3	1	0
<b>CO2</b>	2	1	1	1	1	1	1	1	0
<b>CO3</b>	2	2	1	1	2	2	2	1	0
<b>CO4</b>	2	1	1	1	0	1	1	1	0
<b>CO5</b>	1	1	1	1	1	1	2	1	0
<b>Average</b>	2	1	1	1	1	1	3	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC602D</b>	<b>COMPUTER GRAPHICS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
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			4	0	0	2	6
<b>C</b>	<b>P</b>	<b>A</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
3	0	0	4	0	0	2	6
<b>PREREQUISITE:</b> Algorithms							
<b>Course Outcomes</b>			<b>Domain</b>		<b>Level</b>		
After the completion of the course, students will be able to							
<b>CO1</b>	<i>Analyze</i> the concepts and relevant mathematics of computer graphics.			Cognitive	Analyze		
<b>CO2</b>	<i>Evaluate</i> various algorithms to scan, convert the basic geometrical primitives, transformations, area filling, clipping.			Cognitive	Evaluate		
<b>CO3</b>	<i>Understand</i> the importance of viewing and projections.			Cognitive	Understand		
<b>CO4</b>	<i>Choose a</i> design application that display graphic images to given specifications.			Cognitive	Apply		
<b>CO5</b>	<i>Recognize</i> the fundamentals of animation and Virtual reality technologies			Cognitive	Analyze		
<b>UNIT I</b>	<b>APPLICATION AREAS OF COMPUTER GRAPHICS</b>					<b>12</b>	
Application Areas of Computer Graphics, Overview of Graphics Systems and Devices. Points and Lines, Line Drawing Algorithms, Mid -Point Circle and Ellipse Algorithms. Filled Area Primitives, Polygon Filling Algorithms. Curve Generation: Bezier and B-Spline Curves.							
<b>UNIT II</b>	<b>2-D GEOMETRICAL TRANSFORMS</b>					<b>12</b>	
2-D Geometrical Transforms: Translation, Scaling, Rotation, Reflection and Shear Transformations Composite Transforms, Transformations between Coordinate Systems. 2-D Viewing: The Viewing Pipeline, Viewing Coordinate Reference Frame, Window to Viewport Coordinate Transformation, Viewing Functions. Line Clipping Algorithms- Cohen-Sutherland and Cyrus Beck Line Clipping Algorithms, Sutherland–Hodgeman Polygon Clipping Algorithm.							
<b>UNIT III</b>	<b>3-D OBJECT REPRESENTATION</b>					<b>12</b>	
3-D Object Representation: Polygon Surfaces, Quadric Surfaces, Spline Representation. 3-D Geometric Transformations: Translation, Rotation, Scaling, Reflection and Shear							

Transformations, Composite Transformations, 3-D Viewing: Viewing Pipeline, Viewing Coordinates, View Volume, General Projection Transforms and Clipping.

<b>UNIT IV</b>	<b>VISIBLE SURFACE DETECTION METHODS</b>	<b>12</b>
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Visible Surface Detection Methods: Classification, Back -Face Detection, Depth- Buffer, Scanline, Depth Sorting, BSP-Tree Methods, Area Sub-Division and Octree Methods  
Illumination Models and Surface Rendering Methods: Basic Illumination Models, Polygon Rendering Methods  
Computer Animation: Design of Animation Sequence, General Computer Animation Functions  
Key Frame Animation, Animation Sequence, Motion Control Methods, Morphing, Warping (Only Mesh Warping)

<b>UNIT V</b>	<b>VIRTUAL REALITY</b>	<b>12</b>
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Virtual Reality: Basic Concepts, Classical Components of VR System, Types of VR Systems, Three-Dimensional Position Trackers, Navigation and Manipulation Interfaces, Gesture Interfaces. Input Devices, Graphical Rendering Pipeline, Haptic Rendering Pipeline, Open GL Rendering Pipeline. Applications of Virtual Reality.

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>
<b>60</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>60+30</b>

**TEXT BOOK**

1. Donald Hearn and M. Pauline Baker, “Computer Graphics with Open GL”, Prentice Hall.
2. R. K Maurya, “Computer Graphics with Virtual Reality”, Wiley

**REFERENCES:**

1. “Computer Graphics Principles & practice”, Foley, Van Dam, Feiner and Hughes, Pearson Education

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

<b>B.Sc CS</b>	<b>PO</b>							<b>PSO</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>2</b>
<b>CO1</b>	2	1	1	1	1	1	3	1	0
<b>CO2</b>	2	1	1	1	1	1	1	1	0
<b>CO3</b>	2	2	1	1	2	2	2	1	0
<b>CO4</b>	2	1	1	1	0	1	1	1	0
<b>CO5</b>	1	1	1	1	1	1	2	1	0

<b>Average</b>	2	1	1	1	1	1	3	1	2
3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation									

<b>XBC603A</b>			<b>MACHINE LEARNING</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
								<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>						<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>PREREQUISITE:</b> Data Mining												
<b>Course Outcomes</b>							<b>Domain</b>		<b>Level</b>			
After the completion of the course, students will be able to												
<b>CO1</b>	<i>Analyze the supervised, unsupervised machine learning approaches</i>						Cognitive		Analyze			
<b>CO2</b>	<i>Understand linear algebra concepts.</i>						Cognitive		Understand			
<b>CO3</b>	<i>Understand a regression machine learning algorithm for solving a problem.</i>						Cognitive		Understand			
<b>CO4</b>	<i>Choose a regularization concepts and solve the problem.</i>						Cognitive		Apply			
<b>CO5</b>	<i>Recognize the neural network model</i>						Cognitive		Analyze			
<b>UNIT I</b>		<b>INTRODUCTION</b>							<b>12</b>			

Concept of Machine Learning, Applications of Machine Learning, Key elements of Machine Learning, Supervised vs. Unsupervised Learning, Statistical Learning: Bayesian Method, The Naive Bayes Classifier.				
<b>UNIT II</b>	<b>LINEAR ALGEBRA</b>			<b>12</b>
Software's for Machine Learning and Linear Algebra Overview: Plotting of Data, Vectorization, Matrices and Vectors: Addition, Multiplication, Transpose and Inverse using Available Tool such as MATLAB.				
<b>UNIT III</b>	<b>REGRESSION</b>			<b>12</b>
Linear Regression: Prediction using Linear Regression, Gradient Descent, Linear Regression with one Variable, Linear Regression with Multiple Variables, Polynomial Regression, Feature Scaling/Selection. Logistic Regression: Classification using Logistic Regression, Logistic Regression vs. Linear Regression, Logistic Regression with one Variable and with Multiple Variables.				
<b>UNIT IV</b>	<b>REGULARIZATION</b>			<b>12</b>
Regularization and its Utility: The problem of Overfitting, Application of Regularization in Linear and Logistic Regression, Regularization and Bias/Variance.				
<b>UNIT V</b>	<b>NEURAL NETWORKS</b>			<b>12</b>
Introduction, Model Representation, Gradient Descent vs. Perceptron Training, Stochastic Gradient Descent, Multilayer Perceptron's, Multiclass Representation, Back Propagation Algorithm.				
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>
<b>60</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>60+30</b>
<b>TEXT BOOK</b>				
<ol style="list-style-type: none"> <li>1. Ethem Alpaydin, "Introduction to Machine Learning" 2nd Edition, The MIT Press, 2009.</li> <li>2. Tom M. Mitchell, "Machine Learning", First Edition by Tata McGraw-Hill Education, 2013.</li> </ol>				



**REFERENCES:**

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning" by Springer, 2007.
2. Mevin P. Murphy, "Machine Learning: A Probabilistic Perspective" by The MIT Press, 2012.

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
CO1	2	1	1	1	1	1	3	1	0
CO2	2	1	1	1	1	1	1	1	0
CO3	2	2	1	1	2	2	2	1	0
CO4	2	1	1	1	0	1	1	1	0
CO5	1	1	1	1	1	1	2	1	0
Average	2	1	1	1	1	1	3	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC603B</b>			<b>HUMAN COMPUTER INTERFACE</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
								<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>						<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>PREREQUISITE:</b> Fundamentals of Computer												
<b>Course Outcomes</b>							<b>Domain</b>	<b>Level</b>				
After the completion of the course, students will be able to												
<b>CO1</b>	<i>Analyze</i> the concepts relating to the design of human - computer interfaces in ways making computer-based systems comprehensive, friendly and usable						<b>Cognitive</b>	<b>Analyze</b>				

<b>CO2</b>	Understand the theoretical dimensions of human factors involved in the acceptance of computer interfaces	Cognitive	Evaluate
<b>CO3</b>	Choose the important aspects of implementation of human-computer interfaces	Cognitive	Apply
<b>CO4</b>	Identify the various tools and techniques for interface analysis, design, and evaluation.	Cognitive	Apply
<b>CO5</b>	Identify the impact of usable interfaces in the acceptance and performance utilization of information systems.	Cognitive	Analyze
<b>UNIT I</b>	<b>INTRODUCTION</b>		<b>12</b>
Introduction: Historical Evolution of HCI, Interactive System Design: Concept of Usability-Definition and Elaboration, HCI and Software Engineering, GUI Design and Aesthetics, Prototyping Techniques.			
<b>UNIT II</b>	<b>MODEL-BASED DESIGN</b>		<b>12</b>
Model-Based Design and Evaluation: Basic Idea, Introduction to Different Types of Models, GOMS Family of Models (KLM And CMN -GOMS), Fitts' Law and Hickhyman's Law.			
<b>UNIT III</b>	<b>GENERAL DEVELOPMENT</b>		<b>12</b>
General Development Guidelines and Principles: Shneiderman's Eight Golden Rules, Norman's Seven Principles, Norman's Model of Interaction, Nielsen's Ten Heuristics with Example of its use, Contextual Inquiry.			
<b>UNIT IV</b>	<b>DIALOG DESIGN</b>		<b>12</b>
Dialog Design: Introduction to Formalism in Dialog Design, Design using FSM (Finite State Machines), State Charts and (Classical) Petri Nets in Dialog Design. Task Modeling and Analysis: Hierarchical Task Analysis (HTA), Engineering Task Models and Concur Task Tree (CTT).			
<b>UNIT V</b>	<b>OBJECT ORIENTED MODELLING</b>		<b>12</b>
Object Oriented Modelling: Object Oriented Principles, Definition of Class and Object and their Interactions, Object Oriented Modelling for User Interface Design, Case Study Related to Mobile Application Development..			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>
			<b>TOTAL</b>

<b>60</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>60+30</b>
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**TEXT BOOK**

1. Dix A., Finlay J., Abowd G. D. and Beale R. Human Computer Interaction, 3rd edition, Pearson Education, 2005.
2. Preece J., Rogers Y., Sharp H., Baniyon D., Holland S. and Carey T. Human Computer Interaction, Addison-Wesley, 1994.
4. B. Shneiderman; Designing the User Interface, Addison Wesley 2000 (Indian Reprint).

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

B.Sc CS	PO							PSO	
	1	2	3	4	5	6	7	1	2
<b>CO1</b>	2	1	1	1	1	1	3	1	0
<b>CO2</b>	2	1	1	1	1	1	1	1	0
<b>CO3</b>	2	2	1	1	2	2	2	1	0
<b>CO4</b>	2	1	1	1	0	1	1	1	0
<b>CO5</b>	1	1	1	1	1	1	2	1	0
<b>Average</b>	2	1	1	1	1	1	3	1	2

3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation

<b>XBC603C</b>	<b>DATA ANALYTICS</b>					<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>		
						<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>		
<b>C</b>	<b>P</b>	<b>A</b>						<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>						<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>6</b>
<b>PREREQUISITE:</b> Data Mining												
<b>Course Outcomes</b>							<b>Domain</b>	<b>Level</b>				
After the completion of the course, students will be able to												

<b>CO1</b>	<i>Analyze</i> what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence	Cognitive	Analyze
<b>CO2</b>	<i>Evaluate</i> AI methods, and which AI methods may be suited to solving a given problem.	Cognitive	Evaluate
<b>CO3</b>	<i>Understand</i> a given problem in the language/framework of different AI methods.	Cognitive	Understand
<b>CO4</b>	<i>Choose an</i> algorithm on a problem formalization, and state the conclusions that the evaluation supports.	Cognitive	Apply
<b>CO5</b>	<i>Recognize</i> the limitations of current Artificial Intelligence techniques	Cognitive	Analyze
<b>UNIT I</b>	<b>INTRODUCTION</b>		<b>12</b>
Data Definitions and Analysis Techniques: Elements, Variables, and Data Categorization, Levels of Measurement, Data Management and Indexing.			
<b>UNIT II</b>	<b>DESCRIPTIVE STATISTICS</b>		<b>12</b>
Descriptive Statistics: Measures of Central Tendency, Measures of Location of Dispersions, Error Estimation and Presentation (Standard Deviation, Variance), Introduction to Probability			
<b>UNIT III</b>	<b>BASIC ANALYSIS TECHNIQUES</b>		<b>12</b>
Basic Analysis Techniques: Statistical Hypothesis Generation and Testing, Chi-Square Test, T -Test, Analysis of Variance, Correlation Analysis, Maximum Likelihood Test.			
<b>UNIT IV</b>	<b>DATA ANALYSIS TECHNIQUES-I</b>		<b>12</b>
Data Analysis Techniques-I: Regression Analysis, Classification Techniques, Clustering Techniques (K-Means, K-Nearest Neighborhood). Data Analysis Techniques-II: Association Rules Analysis, Decision Tree.			
<b>UNIT V</b>	<b>INTRODUCTION TO R PROGRAMMING</b>		<b>12</b>
Introduction to R Programming: Introduction to R Software Tool, Statistical Computations using R (Mean, Standard Deviation, Variance, Regression, Correlation etc.). Practice and Analysis with R and Python Programming, Sensitivity Analysis.			

<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>SELF STUDY</b>	<b>TOTAL</b>
<b>60</b>	<b>0</b>	<b>0</b>	<b>30</b>	<b>60+30</b>

**TEXT BOOK**

1. Probability and statistics for Engineers and Scientists (9 Edn.), Ronald E Walppole, Raymond H Myres, Sharon L. Myres and Leying Ye, Prentice Hall Inc
2. The Elements of Statistical Learning, Data Mining, Inference, and Prediction (2nd Edn.) Trevor Hastie Robert Tibshirani Jerome Friedman, Springer, 2014

**REFERENCES:**

1. Software for Data Analysis: Programming with R (Statistics and Computing), John M. Chambers, Springer

**Mapping of Course Outcomes (CO) with Programme Outcomes (PO):**

<b>B.Sc.</b>	<b>PO</b>							<b>PSO</b>	
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>1</b>	<b>2</b>
<b>CO1</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>CO2</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>CO3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>CO4</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>2</b>
<b>CO5</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>2</b>
<b>Average</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>2</b>

**3–High Relation, 2–Medium Relation, 1–Low Relation, 0–No Relation**