DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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PERIYAR MANIAMMAI INSTITUTE OF SCIENCE & TECHNOLOGY
PMIST

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

CURRICULUM (From I – VIII Semesters)

&

SYLLABUS (From I –IV Semesters)

(For the candidates admitted from 2018-19 onwards
Based on Outcome Based Education)

FOR

B.Tech (Computer Science and Engineering)

DEGREE PROGRAMME

VISION	To be a University of global dynamism with excellence in knowledge and innovation ensuring social responsibility for creating an egalitarian society.

MISSION	**UM1**	**Offering well balanced programmes with scholarly faculty and state-of-art facilities to impart high level of knowledge.**
	UM2	Providing student - centred education and foster their growth in critical thinking, creativity, entrepreneurship, problem solving and collaborative work.
	UM3	Involving progressive and meaningful research with concern for sustainable development.
	UM4	Enabling the students to acquire the skills for global competencies.
	UM5	Inculcating Universal values, Self respect, Gender equality, Dignity and Ethics.

CORE VALUES

- Student – centric vocation
- Academic excellence
- Social Justice, equity, equality, diversity, empowerment, sustainability
- Skills and use of technology for global competency.
- Continual improvement
- Leadership qualities.
- Societal needs
- Learning, a life – long process
- Team work
- Entrepreneurship for men and women
- Rural development
- Basic, Societal, and applied research on Energy, Environment, and Empowerment.

VISION	To produce professionals who can relate theory and practice, familiar with common themes and apply concepts of Computer Science and Engineering for Research and Societal development.

MISSION	**DM1**	To offer UG, PG, Ph.D. programme with state of art facilities in the field of Computer Science and Engineering
	DM2	To prepare the students become globally competent by enhancing their skills to work in IT Industries and R & D organizations
	DM3	To prepare the students with good ethical attitude and an ability to relate engineering issues to broader social context
	DM4	To promote significant research in cutting edge Information Communication technologies with environmental consciousness.

Table: 1 Mapping of University Mission (UM) and Department Mission (DM)

	UM 1	**UM 2**	**UM 3**	**UM 4**	**UM 5**
DM 1	3	3	2	2	2
DM 2	2	3	2	3	1
DM 3	1	1	3	2	3
DM 4	2	2	2	2	3
	8	**9**	**9**	**9**	**9**

1-Low 2- Medium 3 – High

PROGRAMME EDUCATIONAL OBJECTIVES

Based on the mission of the department, the programme educational objectives is formulated as

PEO1	Graduates will attain the expertise of analyzing and specifying the requirements for any computing system as well as capable of modeling, designing, implementing and verifying a computing system to meet specified requirements using contemporary tools
PEO2	Graduates will possess diversified professional skills for successful career.
PEO3	Graduates of the programme will have the competencies for communicating, planning, coordinating, organizing, decision making and leading a team
PEO4	Graduates of the programme will have knowledge of professional, interpersonal and ethical responsibility and will contribute to society through active research

Table: 2 Mapping of Program Educational Objectives (PEOs) with Department Mission (DM)

	DM 1	**DM 2**	**DM3**	**DM 4**
PEO 1	3	2	2	2
PEO 2	3	3	2	1
PEO 3	2	2	1	1
PEO 4	2	1	3	3
	10	**8**	**8**	**7**

1- Low 2 – Medium 3-High

GRADUATE ATTRIBUTES

1. **Knowledge base for Engineering:** Demonstrate competence in mathematics, natural sciences, engineering fundamentals and specialized engineering knowledge appropriate to the programme.
2. **Analytical Skills:** Identify, formulate, analyze and solve diverse engineering problems.
3. **Design:** Solution for complicated open–ended engineering problems and design the components with appropriate standards to meet specified needs with proper attention to public health, safety, environment and society.
4. **Experimental Investigation:** Technical skills to conduct investigation, interpretation of observed data and provide solution for multifaceted problems.
5. **Modern Engineering tools usage**: Acquire, select, manipulate relevant techniques, resources and advanced engineering ICT tools to operate simple to complex engineering activities.
6. **Impact of engineering on society:** Provide a product / project for use by the public towards their health, welfare, safety and legal issues to serve the society effectively.
7. **Environment and Sustainability:** Design eco-friendly and sustainable products in demonstrating the technology development to meet present and future needs.
8. **High Ethical Standards:** Practice ethical codes and standards endorsed by professional engineers.
9. **Leadership and team work:** Perform as an individual and as a leader in diverse teams and in multi-disciplinary scenarios.
10. **Communication Skills:** Professional communication with the society to comprehend and formulate reports, documentation, effective delivery of presentation and responsible to clear instructions.
11. P**roject management and Finance:** Appropriate in incorporating finance and business practices including project, risk and change management in the practice of engineering by understanding their limitations.
12. **Life-long learners:** Update the technical needs in a challenging world in equipping themselves to maintain their competence.

PROGRAM OUTCOMES

PO 1	An ability to apply knowledge of computing and mathematics appropriate to the discipline.
PO 2	An ability to analyze a problem, interpret data, and define the computing system requirements which would be appropriate to the solution.
PO 3	An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs
PO 4	An ability to apply creativity in the design of systems which would help to investigate the complex problem and provide software solution.
PO 5	An ability to use the computing techniques, skills, and modern system tools necessary for practice as a CSE professional
PO 6	An ability to analyze the local and global impact of computing on individuals, organizations, and society
PO 7	An ability to develop and use the software systems within realistic constraints environmental, health and safety, manufacturability, and sustainability considerations
PO 8	An ability in an understanding of professional, ethical, legal, security and social issues and responsibilities
PO 9	An ability to function effectively on teams and individually to accomplish a common goal
PO 10	An ability to communicate effectively with a range of audiences by written and oral
PO 11	ability to plan, organize and follow best practices and standards so that the project is completed as successfully by meeting performance, quality at CMM level, budget and time
PO 12	An ability to engage in Lifelong learning and continuing professional development
	PROGRAM SPECIFIC OUTCOME
PSO1	Ability to employ latest computer languages, environments and platforms for solving problems in the areas of emerging communication technologies.
PSO2	Ability to use knowledge in data analytics and mining for industrial problems

Table 3 Mapping of Program Educational Objectives (PEOs) with Program Outcomes (POs)

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
PEO 1	3	3	3	3	3	1	1	1	0	1	1	1	3	3
PEO 2	3	2	2	2	2	2	2	0	0	0	1	1	2	2
PEO 3	0	0	0	0	0	0	0	1	3	3	2	1	0	0
PEO 4	1	1	1	1	0	0	0	2	0	0	2	1	0	0
	7	6	6	6	5	3	3	4	3	4	6	4	5	5

1 - Low 2 – Medium 3 - High

STRUCTURE OF B.Tech COMPUTER SCIENCE AND ENGINEERING PROGRAMME

S.No	Topic	Symbol	Credits
1.	Humanities and Social Sciences including Management	HSMC	11
2.	Basic Sciences	BSC	22
3.	Engineering Sciences including workshop, drawing, basics of Electrical/mechanical/computer etc.	ESC	24
5.	Professional Subjects: Subjects relevant to chosen specialization/branch	PCC-CSE	56
	Professional Elective courses relevant to chosen specialization/branch	PEC-CSE	18
6.	Open Subjects: Electives from other technical and/or emerging subjects	OEC-CSE	12
7.	Project work, seminar and internship in industry or elsewhere	PROJ-CSE	15
8.	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]	MC	0
9.	Minor courses		2
	Total		160

HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT

Sl. No	Code No.	Subject	Semester	Credits
		English	I	3
		Entrepreneurship Development	III	2
		Total Quality Management	IV	3
		Economics for Engineers	VI	3
	TOTAL			11

BASIC SCIENCE COURSES

Sl. No	Code No.	Subject	Semester	Credits
		Calculus & Linear Algebra	I	4
		Chemistry (Lab included)	I	5.5
		Semiconductor Physics(Lab Included)	II	5.5
		Probability and Statistics	II	4
		Calculus and Ordinary Differential Equations	III	3
		Biology	VII	0
	TOTAL			22

ENGINEERING SCIENCE COURSES

Sl. No	Code No.	Subject	Semester	Credits
		Programming for Problem Solving	I	5
		Workshop/ Manufacturing Practices	I	3
		Basic Electrical Engineering	II	5
		Engineering Graphics & Design	II	3
		Analog & Digital Electronics Circuits	III	5
		Signals & Systems	V	3
	TOTAL			24

PROFESSIONAL CORE COURSES

Sl. No	Code No.	Subject	Semester	Credits
		Data Structures & Algorithms	III	5
		Design & Analysis of Algorithms	III	5
		Discrete Mathematics	IV	4
		Computer Organization & Architecture	IV	5
		Operating Systems	IV	5
		Object Oriented Programming	IV	4
		Formal Language & Automata Theory	V	3
		Database Management Systems	V	5
		Software Engineering	V	5
		IT Workshop	V	2
		Complier Design	VI	5
		Computer Networks	VI	5
		Cyber Security	VIII	3
	TOTAL			**56**

PROFESSIONAL ELECTIVE COURSES

Sl. No	Code No.	Subject	Semester	Credits
		Elective-I	V	3
		Elective-II	VI	3
		Elective-III	VI	3
		Elective-IV	VII	3
		Elective-V	VII	3
		Elective-VI	VIII	3

OPEN ELECTIVE COURSES

Sl. No	Code No.	Subject	Semester	Credits
		Open Elective-I	VI	3
		Open Elective-II	VII	3
		Open Elective-III	VIII	3
		Open Elective-IV	VIII	3

SEMESTER-WISE STRUCTURE OF CURRICULUM

REGULATIONS – 2018

(Applicable to the students admitted from the Academic year 2018-19)

SEMESTER I

Sub. Code	Category	Name of the Course	L	T	P	C
XMA101	BSC	Calculus and Linear Algebra	3	1	0	4
XCP102	ESC	Programming for Problem Solving	3	0	4	5
XGS103	HSMC	English	2	0	2	3
XAP104	BSC	Applied Chemistry for Engineers	3	1	3	5
XWS105	ESC	Workshop Practices	1	0	4	3
		TOTAL				**20**

SEMESTER II

Sub. Code	Category	Name of the Course	L	T	P	C
XMA201	BSC	Calculus, Ordinary Differential Equations And Complex Variable	3	1	0	4
XES202	AICTE	Environmental Studies	3	0	0	0
XBE203	ESC	Electrical And Electronics Engineering Systems	3	1	2	5
XAP204	BSC	Applied Physics for Engineers	3	1	2	6
XEG 205	ESC	Engineering Graphics	2	0	1	3
		TOTAL				**18**

SEMESTER III

Sub. Code	Category	Name of the Course	L	T	P	C
XMA301	BSC	Probability and Statistics	3	1	0	4
XCS302	ESC	Analog & Digital Electronics Circuits	3	0	2	5
XCS303	PCC	Data Structures & Algorithms	3	0	4	5
XCS304	PCC	Design & Analysis of Algorithms	3	0	4	5
XES306	HSMC	Entrepreneurship Development	2	0	0	2
XCI307	AICTE	Constitution of India	3	0	0	0
		TOTAL				**20**

SEMESTER IV

Sub. Code	Category	Name of the Course	L	T	P	C
XMA401	PCC	Discrete Mathematics	3	1	0	4
XCS402	PCC	Computer Organization & Architecture	3	0	4	5
XCS403	PCC	Operating Systems	3	0	4	5
XCS404	PCC	Object Oriented Programming	2	0	4	4
XUM405	HSMC	Total Quality Management	3	0	0	3
		TOTAL				**21**

SEMESTER V

Sub. Code	Category	Name of the Course	L	T	P	C
	ESC	Signals & Systems	3	0	0	3
	PCC	Formal Language & Automata Theory	3	0	0	3
	PCC	Database Management Systems	3	0	4	5
	PCC	Software Engineering	3	0	4	5
	PCC	IT Workshop	1	0	2	2
	PEC	Elective-I	3	0	0	3
	Minor	Web designing with JOOMLA	1	0	0	1
		TOTAL				**22**

SEMESTER VI

Sub. Code	Category	Name of the Course	L	T	P	C
	PCC	Complier Design	3	0	4	5
	PCC	Computer Networks	3	0	4	5
	PEC	Elective- II	3	0	0	3
	PEC	Elective- III	3	0	0	3
	OEC	Open Elective –I	3	0	0	3
	HSMC	Economics for Engineers	3	0	0	3
		Project –I	0	0	4	2
		TOTAL				**24**

SEMESTER VII

Sub. Code	Category	Name of the Course	L	T	P	C
	OEC	Open Elective –II	3	0	0	3
	PEC	Elective-IV	3	0	0	3
	PEC	Elective-V	3	0	0	3
	BSC	Biology	0	0	0	0
	UGC	Disaster Management	3	0	0	0
	Minor	R Programming	1	0	0	1
		Project – II	0	0	12	6
		In plant Training	0	0	1	1
		TOTAL				17

SEMESTER VIII

Sub. Code	Category	Name of the Course	Hours per week			C
			L	T	P	
	UGC	Cyber Security	3	0	0	3
	OEC	Open Elective -III	3	0	0	3
	OEC	Open Elective -IV	3	0	0	3
	PEC	Elective – VI	3	0	0	3
		Project – III	0	0	12	6
		TOTAL				18

TOTAL CREDITS - 160

PROFESSIONAL ELECTIVE COURSE -
COMPUTER SCIENCE AND ENGINEERING [PEC-CSE]

The Professional Elective Courses are offered from the following Specialized Threads:

No.	Threads
I.	Theory and Algorithms
II.	Applications
III.	Data Science and Machine Intelligence
IV.	Systems

Professional Elective Courses-I:

Sub. Code	Category	Name of the Course	Hours per week			C
			L	T	P	
XCSE51	PEC-I	Artificial Intelligence	3	0	0	3
XCSE52	PEC-I	Graph Theory	3	0	0	3
XCSE53	PEC-I	Theory of Computation	3	0	0	3
XCSE54	PEC-I	Information Theory and Coding	3	0	0	3

Professional Elective Courses-II:

Sub. Code	Category	Name of the Course	Hours per week			C
			L	T	P	
XCSE61	PEC-II	Web and Internet Technology	3	0	0	3
XCSE62	PEC-II	Queuing Theory and Modelling	3	0	0	3
XCSE63	PEC-II	Distributed Systems	3	0	0	3
XCSE64	PEC-II	Cryptography and Network Security	3	0	0	3

Professional Elective Courses-III:

Sub. Code	Category	Name of the Course	Hours per week			C
			L	T	P	
XCSE66	PEC-III	Data Mining	3	0	0	3
XCSE67	PEC-III	Optimization Techniques	3	0	0	3
XCSE68	PEC-III	Multi Agent Intelligent Systems	3	0	0	3
XCSE69	PEC-III	Image processing	3	0	0	3

Professional Elective Courses-IV:

Sub. Code	Category	Name of the Course	Hours per week			C
			L	T	P	
XCSE71	PEC-IV	Information Retrieval	3	0	0	3
XCSE72	PEC-IV	Cloud Computing	3	0	0	3
XCSE73	PEC-IV	Fault Tolerant Computing	3	0	0	3
XCSE74	PEC-IV	Computer Graphics	3	0	0	3

Professional Elective Courses-V:

Sub. Code	Category	Name of the Course	Hours per week			C
			L	T	P	
XCSE76	PEC-V	Machine Learning	3	0	0	3
XCSE77	PEC-V	Adhoc and Sensor Networks	3	0	0	3
XCSE78	PEC-V	Embedded Systems	3	0	0	3
XCSE79	PEC-V	Green Computing	3	0	0	3
XCSE7A	PEC-V	Quantum Computing	3	0	0	3

Professional Elective Courses-VI:

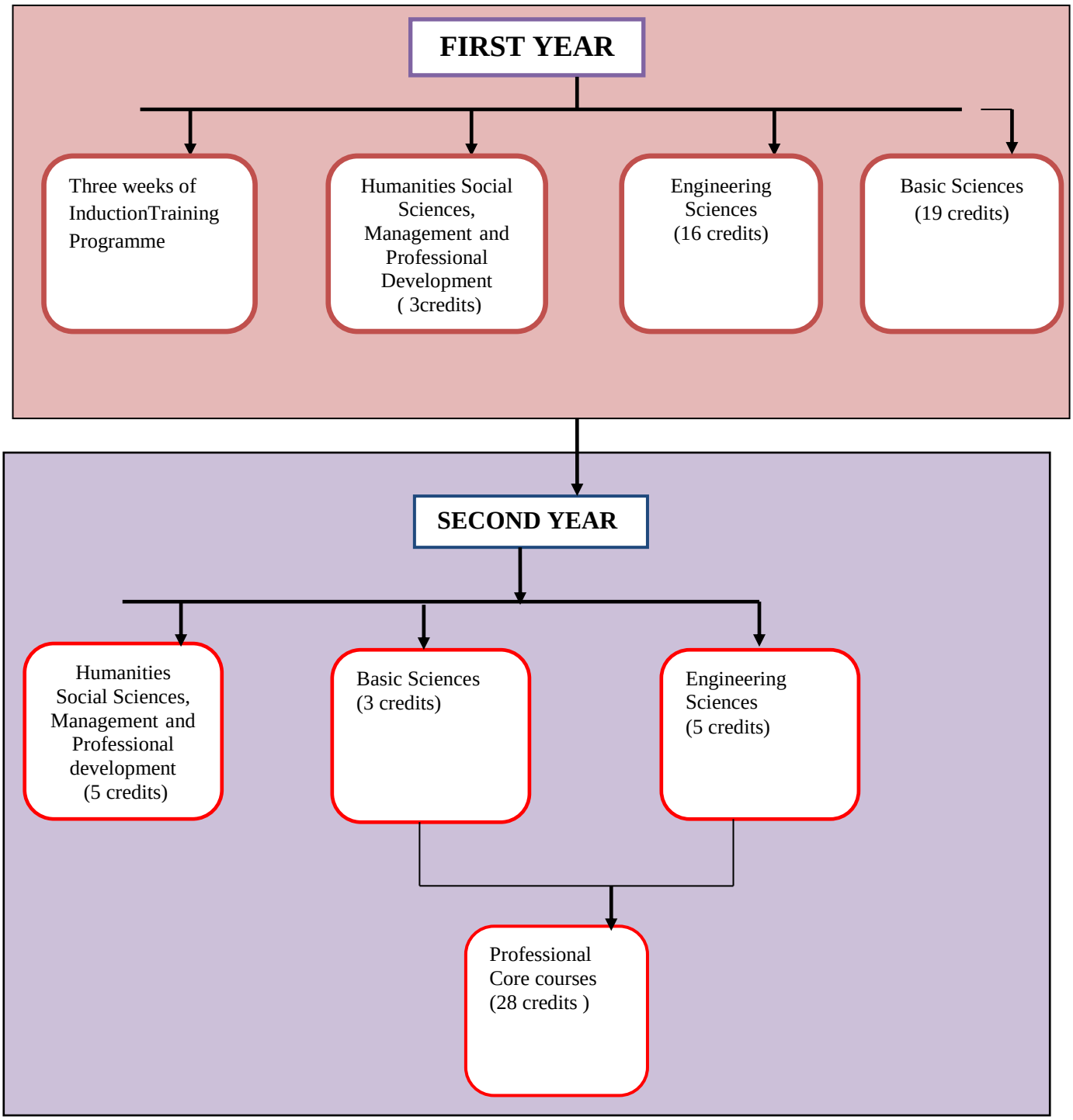
Sub. Code	Category	Name of the Course	Hours per week			C
			L	T	P	
XCSE81	PEC-VI	Data Analytics	3	0	0	3
XCSE82	PEC-VI	Speech and Natural Language Processing	3	0	0	3
XCSE83	PEC-VI	Business Intelligence	3	0	0	3
XCSE84	PEC-VI	Soft Computing	3	0	0	3
XCSE85	PEC-VI	Internet of Things	3	0	0	3
XCSE86	PEC-VI	Real Time Systems	3	0	0	3

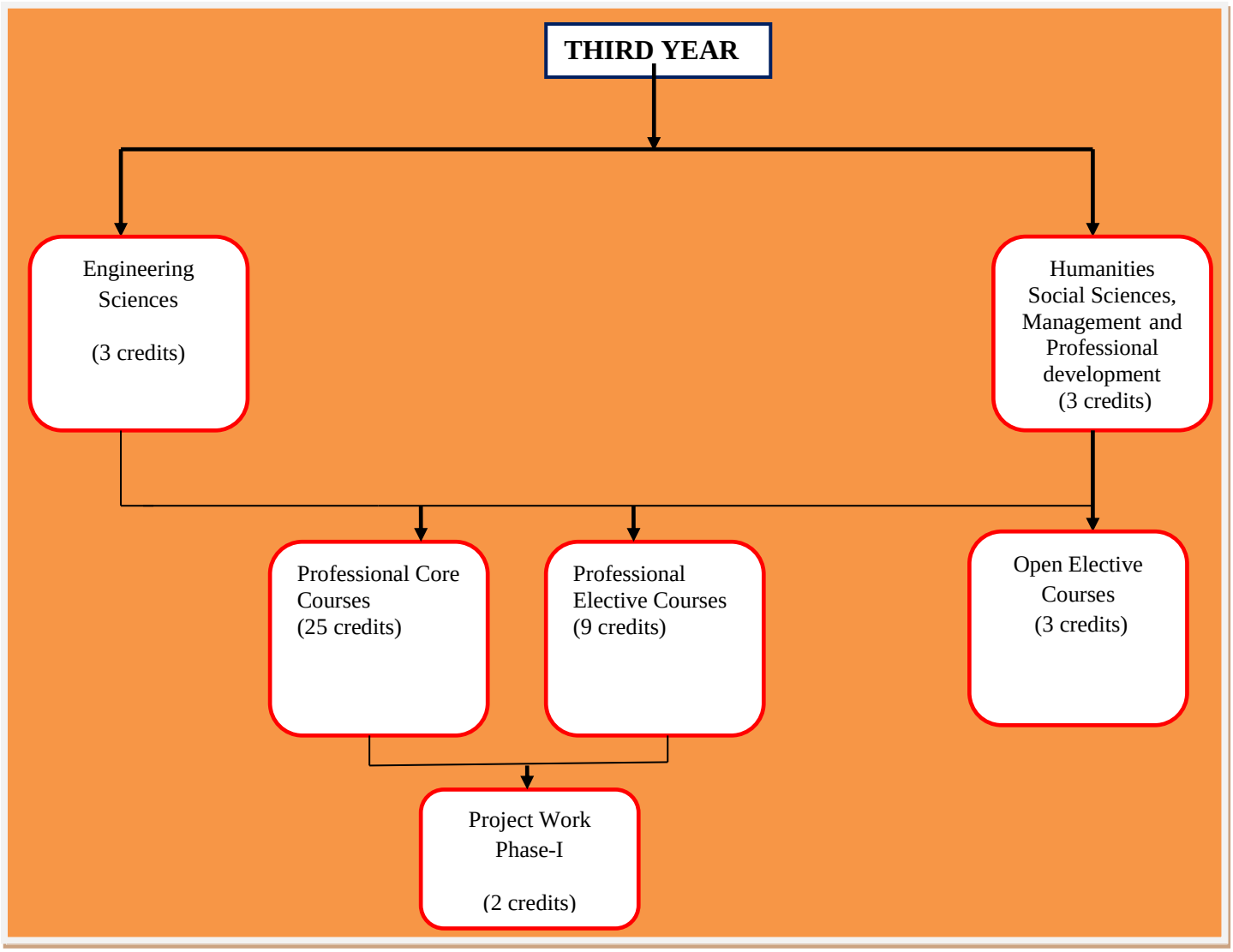
ADDITIONAL COURSES FOR B.TECH. (HONS.)

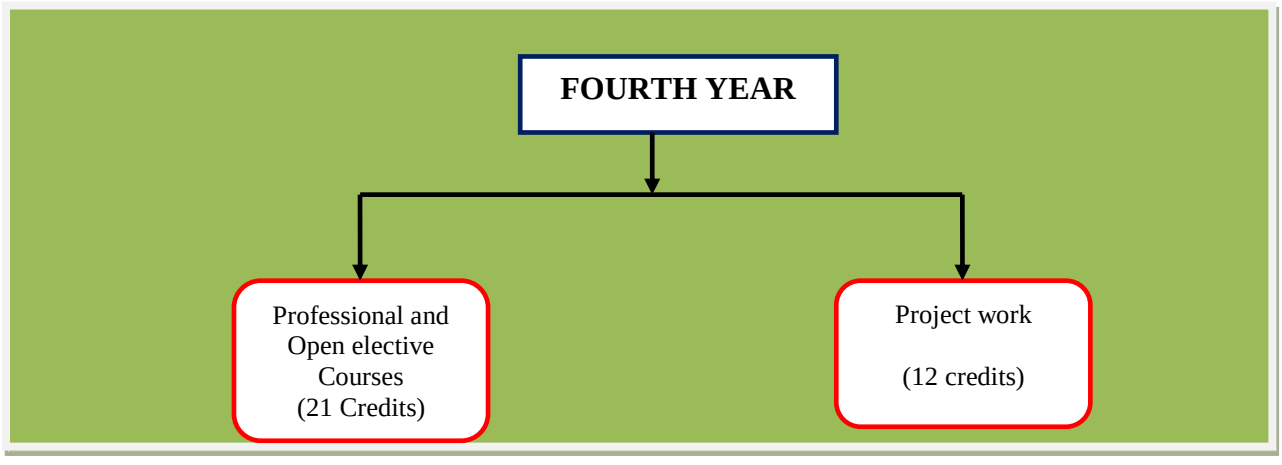
In order to have an Honours degree, a student should earn 19-20 credits from the following courses in addition. The professional electives may be selected **excluding** these.

* Elective Code No.	Course Title	L	T	P	C	H
XCSEH1	Neural Networks and Deep Learning	3	0	0	3	4
XCSEH2	Parallel and Distributed Algorithms	3	0	0	3	4
XCSEH3	Digital Signal Processing	3	0	0	3	4
XCSEH4	Electronic Design Automation	3	0	0	3	4
XCSEH5	Advanced Operating System	3	0	0	3	4
XCSEH6	Information Security	3	0	0	3	4
XCSEH7	Context Aware Computing	3	0	0	3	4
XCSEH8	Storage Technologies	3	0	0	3	4

FLOW CHART FOR THE ENTIRE PROGRAMME




THIRD YEAR
Engineering Sciences
(3 credits)
Humanities Social Sciences, Management and Professional development
(3 credits)
Professional Core Courses
(25 credits)
Professional Elective Courses
(9 credits)
Open Elective Courses
(3 credits)
Project Work Phase-I
(2 credits)


FOURTH YEAR
Professional and Open elective Courses
(21 Credits)
Project work
(12 credits)

Semester I

COURSE CODE			XMA101	L	T	P	C
COURSE NAME			Calculus and Linear Algebra	3	1	0	4
C	P	A		L	T	P	H
3.0	0.5	0.5		3	1	0	4

PREREQUISITE: Differentiation and Integration		DOMAIN	LEVEL
CO1	**Apply** orthogonal transformation to reduce quadratic form to canonical forms.	Cognitive	Remembering Applying
CO2	**Apply** power series to tests the convergence of the sequences and series. Half range Fourier sine and cosine series.	Cognitive Psychomotor	Applying Remembering Guided Response
CO3	**Find** the derivative of composite functions and implicit functions.Euler's theorem and Jacobian	Cognitive Psychomotor	Remembering Guided Response
CO4	**Explain** the functions of two variables by Taylors expansion, by finding maxima and minima with and without constraints using Lagrangian Method. Directional derivatives, Gradient, Curl and Divergence.	Cognitive Affective	Remembering Understanding Receiving
CO5	**Apply** Differential and Integral calculus to notions of Curvature and to improper integrals.	Cognitive	Applying

Unit 1: Matrices	**12**
Linear Transformation - Eigen values and Eigen vectors -Properties of Eigen values and Eigen vectors - Cayley-Hamilton Theorem – Diagonalisation of Matrices – Real Matrices: Symmetric - Skew-Symmetric and Orthogonal Quadratic form – canonical form - Nature of Quadratic form and Transformation of Quadratic form to Canonical form (Orthogonal only).	
Unit 2: Sequences and series	**12**
Sequences: Definition and examples-Series: Types and convergence- Series of positive terms – Tests of convergence: comparison test, Integral test and D'Alembert's ratio test-. Fourier series: Half range sine and cosine series- Parseval's Theorem.	
Unit 3: Multivariable Calculus: Partial Differentiation	**12**
Limits and continuity –Partial differentiation – Total Derivative – Partial differentiation of Composite Functions: Change of Variables – Differentiation of an Implicit Function - Euler's Theorem- Jacobian.	
Unit 4: Multivariable Calculus: Maxima and Minima and Vector Calculus	**12**
Taylor's theorem for function of Two variables- Maxima, Minima of functions of two variables: with and without constraints - Lagrange's Method of Undetermined Multipliers – Directional Derivatives - Gradient, Divergence and Curl.	

Unit 5: Differential and Integral Calculus	**12**
Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	

LECTURE	**TUTORIAL**	**TOTAL**
45	**15**	**60**

Text Books:

1. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill New Delhi, 11th Reprint, 2015**. (Unit-1, Unit-3 and Unit-4).**

2. N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2014. **(Unit-2).**

3. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 40th Edition, 2010. **(Unit-5).**

Reference Books:

1. G.B. Thomas and R.L. Finney, "Calculus and Analytic geometry", 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., "Engineering Mathematics for first year", Tata McGraw-Hill, New Delhi, 2008.
3. D. Poole, "Linear Algebra: A Modern Introduction", 2nd Edition, Brooks/Cole, 2005.
4. Erwin kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.

Cos Versus GA mapping

Table 1: Mapping of Cos with GAs:

	GA											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO 1	3	2	0	0	2	0	0	0	0	1	0	2
CO 2	3	1	0	0	0	0	0	0	0	1	0	1
CO 3	3	1	0	0	0	0	0	0	0	1	0	1
CO 4	3	2	0	0	0	0	0	0	0	1	0	1
CO 5	3	2	0	0	1	0	0	0	0	1	0	2
Total	15	8	0	0	3	0	0	0	0	5	0	7
Scaled Value	3	2	0	0	1	0	0	0	0	1	0	2

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO 1	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 2	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 3	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 4	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 5	3	2	1	1	2	1	0	0	0	0	0	1	1	1
Total	15	10	5	5	10	5	0	0	0	0	0	5	5	5
Scaled Value	3	2	1	1	2	1	0	0	0	0	0	1	1	1

1-5 ⟶ 1 , 6-10 ⟶ 2 , 11-15 ⟶ 3

1-Low relation , 2- Medium relation , 3- High relation

COURSE CODE			XCP102	L	T	P	C
COURSE NAME			PROGRAMMING FOR PROBLEM SOLVING	3	0	2	5
C	P	A		L	T	P	H
3.2	1.8	0.0		3	0	3	6

COURSE OUTCOME			
		Level	**Domain**
CO1	***Define*** programming fundamentals and ***Solve*** simple programs using I/O statements	Remember Understand Apply	Cognitive Psychomotor
CO2	***Define*** syntax and ***write simple programs*** using control structures and arrays	Remember Understand Apply	Cognitive Psychomotor
CO3	***Explain*** and ***write simple programs*** using functions and pointers	Understand Apply	Cognitive Psychomotor
CO4	***Explain*** and ***write simple programs*** using structures and unions	Understand Apply Analyze	Cognitive Psychomotor
CO5	***Explain*** and ***write simple programs*** using files and ***Build*** simple projects	Remember Understand Create	Cognitive Psychomotor

COURSE CONTENT		Hours
UNIT I	**PROGRAMMING FUNDAMENTALS AND INPUT / OUTPUT STATEMENTS**	**9 + 9**
	Theory Introduction to components of a computer system, Program – Flowchart – Pseudo code – Software – Introduction to C language – Character set – Tokens: Identifiers, Keywords, Constants, and Operators – sample program structure -Header files – Data Types-Variables - Output statements – Input statements. **Practical** 1. Program to display a simple picture using dots. 2. Program for addition of two numbers 3. Program to swap two numbers 4. Program to solve any mathematical formula.	
UNIT II	**CONTROL STRUCTURE AND ARRAYS**	**9 + 9**
	Theory Control Structures – Conditional Control statements: Branching, Looping - Unconditional control structures: switch, break, continue, goto statements – Arrays: One Dimensional Array – Declaration – Initialization – Accessing Array Elements – Searching – Sorting – Two Dimensional arrays - Declaration – Initialization – Matrix Operations – Multi Dimensional Arrays - Declaration – Initialization. Storage classes: auto – extern – static. Strings: Basic operations on strings.	

	Practical 1. Program to find greatest of 3 numbers using Branching Statements 2. Program to display divisible numbers between n1 and n2 using looping Statement 3. Program to remove duplicate element in an array. 4. Program to perform string operations. 5. Performing basic sorting algorithms	
UNIT III	**FUNCTIONS AND POINTERS**	**9 + 9**
	Theory Functions: Built in functions – User Defined Functions - Parameter passing methods - Passing arrays to functions – Recursion - Programs using arrays and functions. Pointers - Pointer declaration - Address operator - Pointer expressions & pointer arithmetic - Pointers and function - Call by value - Call by Reference - Pointer to arrays - Use of Pointers in self-referential structures-Notion of linked list(no implementation). **Practical** 1. Program to find factorial of a given number using four function types. 2. Programs using Recursion such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort 3. Programs using Pointers	
UNIT IV	**STRUCTURES AND UNIONS**	**9 + 9**
	Theory Structures and Unions - Giving values to members - Initializing structure - Functions and structures - Passing structure to elements to functions - Passing entire function to functions - Arrays of structure - Structure within a structure and Union. **Practical** 1. Program to read and display student mark sheet Structures with variables 2. Program to read and display student marks of a class using Structures with arrays 3. Program to create linked list using Structures with pointers	
UNIT V	**FILES**	**9 + 9**
	Theory File management in C - File operation functions in C - Defining and opening a file - Closing a file - The getw and putw functions - The fprintf & fscanf functions - fseek function – Files and Structures. **Practical** 1. Program for copying contents of one file to another file. 2. Program using files using structure with pointer	

	LECTURE	**PRACTICAL**	**TOTAL**
	45	**45**	**90**

TEXT BOOKS /REFERENCE BOOKS

1. Byron Gottfried, "Programming with C", III Edition, (Indian Adapted Edition), TMH publications, 2010
2. Yeshwant Kanethker, “Let us C”, BPB Publications, 2008
3. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. 2005
4. Behrouz A. Forouzan and Richard. F. Gilberg, "A Structured Programming Approach Using C", II Edition, Brooks–Cole Thomson Learning Publications, 2001
5. Johnson baugh R. and Kalin M., “Applications Programming in ANSI C”, III Edition, Pearson Education India, 2003
6. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill, 7th edition 2017.

Table 1: COs Versus POs Mapping

	PO												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	0	0	3	0	0	0	0	0	2	3	2	0
CO2	3	2	0	0	2	0	0	0	0	0	2	3	2	0
CO3	2	2	1	2	2	0	0	0	0	0	2	2	2	0
CO4	2	2	1	2	2	0	0	0	0	0	2	2	2	0
CO5	2	2	1	0	2	0	0	1	0	2	2	2	2	0
Total	12	10	3	4	11	0	0	1	0	2	10	12	10	0
Scaled Value	3	2	1	1	3	0	0	1	0	1	2	3	2	0

$1 - 5 \rightarrow 1$, $6 - 10 \rightarrow 2$, $11 - 15 \rightarrow 3$

1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XGS103	L	T	P	SS	C
COURSE NAME			ENGLISH	2	0	1	0	3
PRE-REQUISITES (IF ANY)				L	T	P	SS	H
C	P	A		2	0	2	0	4
2.0	6.0	4.0						

COURSE OUTCOMES:		Domain	Level
CO1	***Ability*** to recall the meaning for proper usage	Cognitive	Remember
CO2	***Apply*** the techniques in sentence patterns	Cognitive	Apply
CO3	***Identify*** the common errors in sentences	Cognitive	Remember
CO4	***Construct*** the Nature and Style of sensible Writing	Cognitive	Create
CO5	***Practicing*** the writing skills	Psychomotor	Guided Response
CO6	***Grasping*** the techniques in learning sounds and etiquettes	Psychomotor	Adapting

UNIT I - Vocabulary Building **9**

1.1 The concept of Word Formation
1.2 Root words from foreign languages and their use in English
1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.
1.4 Synonyms, antonyms, and standard abbreviations.

UNIT II - Basic Writing Skills **9**

2.1 Sentence Structures
2.2 Use of phrases and clauses in sentences
2.3 Importance of proper punctuation
2.4 Creating coherence
2.5 Organizing principles of paragraphs in documents
2.6 Techniques for writing precisely

UNIT III - Identifying Common Errors in Writing **9**

3.1 Subject-verb agreement
3.2 Noun-pronoun agreement
3.3 Misplaced modifiers
3.4 Articles
3.5 Prepositions
3.6 Redundancies
3.7 Clichés

UNIT IV - Nature and Style of sensible Writing **9**

4.1 Describing
4.2 Defining
4.3 Classifying
4.4 Providing examples or evidence
4.5 Writing introduction and conclusion

UNIT V - Writing Practices	**9**
5.1 Comprehension 5.2 Précis Writing 5.3 Essay Writing	
Unit VI - Oral Communication (This unit involves interactive practice sessions in Language Lab) □ Listening Comprehension □ Pronunciation, Intonation, Stress and Rhythm □ Common Everyday Situations: Conversations and Dialogues □ Communication at Workplace □ Interviews □ Formal Presentations	
Suggested Readings: (i) Practical English Usage. Michael Swan. OUP. 1995 (ii) Remedial English Grammar. F.T. Wood. Macmillan.2007 (iii) On Writing Well. William Zinsser. Harper Resource Book. 2001 (iv) Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006 (v) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011 (vi) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.	

Table 1: Mapping of Cos with POs:

	PO												**PSO**	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	0	0	0	0	0	2	0	1	0	0	0	0	0
CO2	2	0	0	0	0	0	2	0	1	0	0	0	0	0
CO3	1	0	0	0	0	0	1	0	1	0	0	0	0	0
CO4	2	0	0	0	0	0	1	0	1	0	0	0	0	0
CO5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	7	0	0	0	0	0	6	0	4	0	0	0	0	0
Scaled Value	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

1- Low Relation, 2 – Medium Relation, 3- High Relation

COURSE CODE			XAC104	L	T	P	C
COURSE NAME			APPLIED CHEMISTRY FOR ENGINEERS	3	1	1	5
C	P	A		L	T	P	H
3.5	1.0	0.5		3	1	2	6
PREREQUISITES			Nil				

COURSE OUTCOMES		Domain	Level
CO1	***Identify*** the periodic properties such as ionization energy, electron affinity, oxidation states and electro negativity. ***Describe*** the various water quality parameters like hardness and alkalinity.	Cognitive Psychomotor	Remember Perception
CO2	***Interpret*** bulk properties and processes using thermodynamic and kinetic considerations	Cognitive Psychomotor	Understand Set
CO3	***Explain*** *and* ***Measure*** microscopic chemistry in terms of atomic, molecular orbitals and intermolecular forces.	Cognitive Psychomotor Affective	Apply Mechanism Receive
CO4	***Apply, Measure*** and ***Distinguish*** the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques	Cognitive Psychomotor Affective	Remember Analyze Perception Respond
CO5	***Describe, Illustrate*** *and* ***Discuss*** the stereochemistry and chemical reactions that are used in the synthesis of molecules.	Cognitive Psychomotor	Remember Apply Mechanism

UNIT – I	PERIODIC PROPERTIES AND WATER CHEMISTRY	8+3+6

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity,electronegativity, polarizability and oxidation states. **Water Chemistry**-Water quality parameters-Definition and explanation of hardness, determination of hardness by EDTA method-Introduction to alkalinity.

UNIT–II	USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA	12+3+6

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Corrosion-Types, factors affecting corrosion rate and Control methods. Use of free energy considerations in metallurgy through Ellingham diagrams. Advantages of electroless plating, electroless plating of nickel and copper on Printed Circuit Board (PCB).

UNIT–III	ATOMIC AND MOLECULAR STRUCTURE	10+3+6

Schrodinger equation. Particle in a box solution and their applications for conjugated molecules and nanoparticles.. Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic molecules. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties.

Band structure of solids and the role of doping on band structures.

Intermolecular forces and potential energy surfaces

Ionic, dipolar and Vander waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.

UNIT-IV	SPECTROSCOPIC TECHNIQUES AND APPLICATIONS	7+3+6

Principles of spectroscopy and selection rules. Electronic spectroscopy-chromophore, auxochromes, types of electronic transition and application. Fluorescence and its applications in medicine. Vibrational spectroscopy-types of vibrations, Instrumentation and applications. Rotational spectroscopy of diatomic molecules. Nuclear magnetic resonance spectroscopy-concept of chemical shift and applications-magnetic resonance imaging. Diffraction and scattering.

UNIT–V	STEREOCHEMISTRY AND ORGANIC REACTIONS	8+3+6

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization reactions and ring opening reactions. Synthesis of a commonly used drug molecule-Aspirin and paracetamol.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL HOURS
Hours	**45**	**15**	**30**	**90**

TEXT BOOKS

1. Puri B.R. Sharma, L.R., Kalia K.K. Principles of Inorganic Chemistry, (23rd edition), New Delhi, Shoban Lal Nagin Chand & Co., 1993
2. Lee. J.D. Concise Inorganic Chemistry, UK, Black well science, 2006.
3. Trapp. C, Cady, M. Giunta. C, Atkins's Physical Chemistry, 10th Edition, Oxford publishers, 2014.
4. Glasstone S., Lewis D., Elements of Physical Chemistry, London, Mac Millan & Co. Ltd, 1983.
5. Morrison R.T. and Boyd R.N. Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., 1976.
6. Banwell. C.N, Fundamentals of Molecular Spectroscopy, (3th Edition), McGraw-Hill Book Company, Europe 1983.
7. Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (4th edition), S./ Chand & Company Ltd. New Delhi, 1977.
8. P. S. Kalsi, Stereochemistry: Conformation and mechanism, (9th Edition), New Age International Publishers, 2017.

REFERENCE BOOKS

1. Puri B R Sharma L R and Madan S Pathania, " Principles of Physical Chemistry", Vishal publishing Co., Edition 2004
2. Kuriocose, J C and Rajaram, J, "Engineering Chemistry", Volume I/II, Tata McGraw-Hill Publishing Co. Ltd. New Delhi, 2000

E Resources - MOOCs:

1. http://www.mooc-list.com/course/chemistry-minor-saylororg
2. https://www.canvas.net/courses/exploring-chemistry
3. http://freevideolectures.com/Course/2263/Engineering-Chemistry-I
4. http://freevideolectures.com/Course/3001/Chemistry-I
5. http://freevideolectures.com/Course/3167/Chemistry-II
6. http://ocw.mit.edu/courses/chemistry/

Laboratory Part **30 hrs**

Experiments :

1. Determination of chloride ion present in the water sample by Argentometric method.	**CO1**
2. Determination of total, temporary and permanent hardness of water sample by EDTA method.	**CO1**
3. Determination of cell constant and conductance of solutions.	**CO2**
4. Potentiometry - determination of redox potentials and emfs.	**CO2**
5. Determination of surface tension and viscosity.	**CO3**
6. Adsorption of acetic acid by charcoal.	**CO3**
7. Determination of the rate constant of a reaction.	**CO4**
8. Estimation of iron by colorimetric method.	**CO4**
9. Synthesis of a polymer/drug.	**CO5**
10. Saponification/acid value of an oil.	**CO5**

REFERENCE BOOKS

1. Mendham, Denney R.C,. Barnes J.D and Thomas N.J.K., "Vogel's Textbook of Quantitative Chemical Analysis", 6th Edition, Pearson Education, 2004.
2. Garland, C. W.; Nibler, J. W.; Shoemaker, D. P. "Experiments in Physical Chemistry", 8th Ed.; McGraw-Hill: New York, 2003.

E Resources - MOOCs:

1.http://freevideolectures.com/Course/2380/Chemistry-Laboratory-Techniques

2. http://freevideolectures.com/Course/2941/Chemistry-1A-General-Chemistry-Fall-2011

3.http://ocw.mit.edu/courses/chemistry/5-301-chemistry-laboratory-techniques

	LECTURE	TUTORIAL	PRACTICAL	TOTAL HOURS
HOURS	**45**	**15**	**30**	**90**

Table 1 : Mapping of CO's with PO's:

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	0	0	0	0	0	2	3	3	0	0	0	0	0
CO2	2	0	0	0	0	0	1	2	2	0	0	0	0	0
CO3	3	0	0	0	0	0	2	3	3	0	0	0	0	0
CO4	3	0	0	0	0	0	3	3	3	0	0	0	0	0
CO5	3	0	0	0	0	0	2	2	3	0	0	0	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE			XWP105	L	T	P	C
COURSE NAME			WORKSHOP PRACTICES	1	0	2	3
C	P	A		L	T	P	H
1.0	3.0	0.0		2	0	4	6

PREREQUISITE:

COURSE OUTCOMES:		Domain	Level
CO1	***Summarize*** the machining methods and ***Practice*** machining operation.	Cognitive Psychomotor	Understanding Guided response
CO2	***Defining*** metal casting process, moulding methodsand **relates** Casting and Smithy applications.	Cognitive Psychomotor	Remembering Perception
CO3	***Plan*** basic carpentry and fitting operation and ***Practice*** carpentry and fitting operations.	Cognitive Psychomotor	Applying Guided response
CO4	***Summarize*** metal joining operation and ***Practice*** welding operation.	Cognitive Psychomotor	Understanding Guided response
CO5	***Illustrate*** the, electrical and electronics basics and ***Makes*** appropriate connections**.**	Cognitive Psychomotor	Understanding Origination

COURSE CONTENT

EXP.NO	TITLE	CO RELATION
1	INTRODUCTION TO MACHINING PROCESS	**CO1**
2	PLAIN TURINING USING LATHE OPERATION	**CO1**
3	INTRODUCTION TO CNC	**CO1**
4	DEMONSTRATION OF PLAIN TURNING USING CNC	**CO1**
5	STUDY OF METAL CASTING OPERATION	**CO2**
6	DEMONSTRATION OF MOULDING PROCESS	**CO2**
7	STUDY OF SMITHY OPERATION	**CO2**
8	STUDY OF CARPENTRY TOOLS	**CO3**
9	HALF LAP JOINT – CARPENTRY	**CO3**
10	MORTISE AND TENON JOINT – CARPENTRY	**CO3**
11	STUDY OF FITTING TOOLS	**CO3**

12	SQUARE FITTING	**CO3**
13	TRIANGULAR FITTING	**CO3**
14	STUDY OF WELDING TOOLS	**CO4**
15	SQUARE BUTT JOINT - WELDING	**CO4**
16	TEE JOINT – WELDING	**CO4**
17	INTRODUCTION TO HOUSE WIRING	**CO5**
18	ONE LAMP CONTROLLED BY ONE SWITCH	**CO5**
19	TWO LAMPS CONTROLLED BY SINGLE SWITCH	**CO5**
20	STAIRCASE WIRING	**CO5**

TEXT BOOKS

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.

REFERENCES

1. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd.
2. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd.,New Delhi
3. Workshop Technology by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi.
4. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi.

E RESOURCES

1. **http://nptel.ac.in/courses/112107145/**

Mapping of CO's with PO'S:

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	2	1	2	2	1	0	0	1	1	0	1	2	0	0
CO2	2	1	2	2	1	0	0	1	1	0	1	2	0	0
CO3	2	1	2	2	1	0	0	1	1	0	1	2	0	0
CO4	2	1	2	2	1	0	0	1	1	0	1	2	0	0
CO5	2	1	2	2	1	0	0	1	1	0	1	2	0	0

$1 - 5 \rightarrow 1$, $6 - 10 \rightarrow 2$, $11 - 15 \rightarrow 3$

1 - Low Relation, 2- Medium Relation, 3- High Relation

SEMESTER II

COURSE CODE			XMA201	L	T	P	C
COURSE NAME			CALCULUS, ORDINARY DIFFERENTIAL EQUATIONS AND COMPLEX VARIABLE	3	1	0	4
C	P	A		L	T	P	H
3.0	0.5	0.5		3	1	0	4

PREREQUISITE: Mathematics I (Calculus and Linear Algebra)

COURSE OUTCOMES:		Domain	Level
CO1	**Find** double and triple integrals and to find line, surface and volume of an integral by **Applying** Greens, Gauss divergence and Stokes theorem.	Cognitive	Applying Remembering
CO2	**Solve** first order differential equations of different types which are solvable for p, y, x and Clairaut's type.	Cognitive	Applying
CO3	**Solve** Second order ordinary differential equations with variable coefficients using various methods.	Cognitive	Applying
CO4	**Use** CR equations to verify analytic functions and to find harmonic functions and harmonic conjugate. Conformal mapping of translation and rotation. Mobius transformation.	Cognitive Psychomotor	Remembering Applying Guided Response
CO5	**Apply** Cauchy residue theorem to evaluate contour integrals involving sine and cosine function and to state Cauchy integral formula, Liouvilles theorem. Taylor's series, zeros of analytic functions, singularities, Laurent's series.	Cognitive Affective	Applying Receiving

Unit -I MULTIVARIABLE CALCULUS (INTEGRATION)	**12**
Multiple Integration: Double integrals (Cartesian) - change of order of integration in double integrals - Change of variables (Cartesian to polar) - Triple integrals (Cartesian), Scalar line integrals - vector line integrals - scalar surface integrals - vector surface integrals - Theorems of Green, Gauss and Stokes.	
Unit –II FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS	**12**
Exact - linear and Bernoulli's equations - Euler's equations - Equations not of first degree: equations solvable for p - equations solvable for y- equations solvable for x and Clairaut's type.	
Unit - III ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDERS	**12**
Second order linear differential equations with variable coefficients- method of variation of parameters - Cauchy-Euler equation- Power series solutions- Legendre polynomials- Bessel functions of the first kind and their properties.	
Unit -IV COMPLEX VARIABLE – DIFFERENTIATION	**12**

Differentiation-Cauchy-Riemann equations- analytic functions-harmonic functions-finding harmonic conjugate- elementary analytic functions (exponential, trigonometric, logarithm) and their properties- Conformal mappings- Mobius transformations and their properties.

Unit - V COMPLEX VARIABLE – INTEGRATION	**12**
Contour integrals - Cauchy-Goursat theorem (without proof) - Cauchy Integral formula (without proof)-Liouville's theorem (without proof)- Taylor's series- zeros of analytic functions-singularities- Laurent's series – Residues- Cauchy Residue theorem (without proof)- Evaluation of definite integral involving sine and cosine- Evaluation of certain improper integrals using the Bromwich contour.	

	LECTURE	**TUTORIAL**	**TOTAL**
	45	**15**	**60**

Text Book:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 40thth Edition, 2008.

Reference Books:

1.G.B. Thomas and R.L. Finney, "Calculus and Analytic geometry", 9th Edition, Pearson, Reprint, 2002.

2. Erwin kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.

3.W. E. Boyce and R. C. DiPrima, "Elementary Differential Equations and Boundary Value Problems", 9thEdn. Wiley India, 2009.

4. S. L. Ross, "Differential Equations", 3rd Ed., Wiley India, 1984.

5.E. A. Coddington, "An Introduction to Ordinary Differential Equations", Prentice Hall India, 1995.

6. E. L. Ince, "Ordinary Differential Equations", Dover Publications, 1958.

7.J. W. Brown and R. V. Churchill, "Complex Variables and Applications", 7th Ed., McGraw Hill, 2004.

8. N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2008.

Cos Versus GA mapping

Table 1: Mapping of Cos with GAs:

	GA											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	2	0	0	2	0	0	0	0	1	0	2
CO 2	3	1	0	0	0	0	0	0	0	1	0	1
CO 3	3	1	0	0	0	0	0	0	0	1	0	1
CO 4	3	2	0	0	0	0	0	0	0	1	0	1
CO 5	3	2	0	0	1	0	0	0	0	1	0	2
Total	15	8	0	0	3	0	0	0	0	5	0	7
Scaled Value	3	2	0	0	1	0	0	0	0	1	0	3

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 2	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 3	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 4	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 5	3	2	1	1	2	1	0	0	0	0	0	1	1	1
Total	15	10	5	5	10	5	0	0	0	0	0	5	5	5
Scaled Value	3	2	1	1	2	1	0	0	0	0	0	1	1	1

1-6 → 1 , 6-10 → 2 , 11-15 → 3

1-Low relation , 2- Medium relation , 3- High relation

COURSE CODE			XES202	L	T	P	C
COURSE NAME			ENVIRONMENTAL STUDIES	3	0	0	0
C	P	A		L	T	P	H
2.5	0.0	0.5		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the significance of natural resources and ***explain*** anthropogenic impacts.	Cognitive	Remembering Understanding
CO2	***Illustrate*** the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.	Cognitive	Understanding
CO3	***Identify*** the facts, consequences, preventive measures of major pollutions and ***recognize*** the disaster phenomenon.	Cognitive Affective	Remembering Receiving
CO4	***Explain*** the socio-economic, policy dynamics and ***practice*** the control measures of global issues for sustainable development.	Cognitive	Understanding Analyzing
CO5	***Recognize*** the impact of population and the concept of various welfare programs, and ***apply*** the modern technology towards environmental protection.	Cognitive	Understanding Applying

UNIT - I INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY — 12

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.

UNIT – II ECOSYSTEMS AND BIODIVERSITY — 7

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.

UNIT – III ENVIRONMENTAL POLLUTION	10

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.

UNIT –IV SOCIAL ISSUES AND THE ENVIRONMENT	10

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.

UNIT –V HUMAN POPULATION AND THE ENVIRONMENT	6

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.

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS

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
3. Trivedi R.K and P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, 2003.
4. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, 2006.
5. Introduction to International disaster management, Butterworth Heinemann, 2006.
6. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, 2004.

REFERENCE BOOKS

1. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media, India, 2009.
2. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
3. S.K.Dhameja, Environmental Engineering and Management, S.K.Kataria and Sons, New Delhi, 2012.
4. Sahni, Disaster Risk Reduction in South Asia, PHI Learning, New Delhi, 2003.
5. Sundar, Disaster Management, Sarup & Sons, New Delhi, 2007.
6. G.K.Ghosh, Disaster Management, A.P.H.Publishers, New Delhi, 2006.

E RESOURCES

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
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
8. http://bookboon.com/en/atmospheric-pollution-ebook
9. http://www.e-booksdirectory.com/details.php?ebook=3749
10. http://www.e-booksdirectory.com/details.php?ebook=2604
11. http://www.e-booksdirectory.com/details.php?ebook=2116
12. http://www.e-booksdirectory.com/details.php?ebook=1026
13. http://www.faadooengineers.com/threads/7894-Environmental-Science

Table:1 Mapping of CO's with B.Tech GA's:

	GA											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	0	0	0	0	0	0	0	0	0	0	1
CO2	2	0	0	0	0	2	1	0	0	1	0	1
CO3	2	1	3	0	0	3	1	0	2	1	0	1
CO4	1	1	2	0	0	3	2	3	0	0	0	1
CO5	2	1	1	0	0	3	0	0	0	0	0	1
Total	**10**	**3**	**6**	0	0	**11**	**4**	**3**	**2**	**2**	0	**5**
Scaled value	**2**	**1**	**2**	0	0	**3**	**1**	**1**	**1**	**1**	0	**1**

Table 2 : Mapping of CO's with PO's:

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	0	0	0	0	0	2	3	3	0	0	0	0	0
CO2	2	0	0	0	0	0	1	2	2	0	0	0	0	0
CO3	3	0	0	0	0	0	2	3	3	0	0	0	0	0
CO4	3	0	0	0	0	0	3	3	3	0	0	0	0	0
CO5	3	0	0	0	0	0	2	2	3	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

COURSE CODE			XBE203	L	T	P	C
COURSE NAME			ELECTRICAL AND ELECTRONICS ENGINEERING SYSTEMS	3	1	1	5
C	P	A		L	T	P	H
3.0	1.0	0.0		3	1	2	6

PREREQUISITES : PHYSICS

COURSE OUTCOMES		Domain	Level
CO1	***Define and Relate*** the fundamentals of electrical parameters and ***build*** and ***explain*** AC, DC circuits by Using measuring devices	Cognitive Psychomotor	Remember Understand Mechanism set
CO2	***Define and Explain*** the operation of DC and AC machines.	Cognitive	Remember Understand
CO3	***Recall and Illustrate*** various semiconductor devices and their applications and displays the input output characteristics of basic semiconductor devices.	Cognitive Psychomotor	Remember Understand Mechanism
CO4	***Relate and Explain the*** number systems and logic gates. ***Construc***t the different digital circuit.	Cognitive Psychomotor	Remember Understand Origination
CO5	***Label and Outline the*** different types of microprocessors and their applications.	Cognitive	Remember Understand

UNIT I- FUNDAMENTALS OF DC AND AC CIRCUITS, MEASUREMENTS **9+6+12**

Fundamentals of DC– Ohm's Law – Kirchoff's Laws - Sources - Voltage and Current relations –Star/Delta Transformation - Fundamentals of AC – Average Value, RMS Value, Form Factor - AC power and Power Factor, Phasor Representation of sinusoidal quantities - Simple Series, Parallel, Series Parallel Circuit - Operating Principles of Moving coil and Moving Iron Instruments (Ammeter, Voltmeter) and Dynamometer type meters (Watt meter and Energy meter).

UNIT II – ELECTRICAL MACHINES **9 + 3+0**

Construction, Principle of Operation, Basic Equations, Types and Application of DC Generators, DC motors - Basics of Single Phase Induction Motor and Three Phase Induction Motor- Construction, Principle of Operation of Single Phase Transformer, Three phase transformers, Auto transformer.

UNIT III – SEMICONDUCTOR DEVICES **9 + 0+8**

Classification of Semiconductors, Construction, Operation and Characteristics: PN Junction Diode – Zener Diode, PNP, NPN Transistors, Field Effect Transistors and Silicon Controlled Rectifier – Applications.

UNIT IV – DIGITAL ELECTRONICS	9 + 3+10
Basic of Concepts of Number Systems, Logic Gates, Boolean Algebra, Adders, Subtractors, multiplexer, demultiplexer, encoder, decoder, Flip-flops, Up/Down counters, Shift Registers.	
UNIT V – MICROPROCESSORS	**9+ 3+0**
Architecture, 8085, 8086 - Interfacing Basics: Data transfer concepts – Simple Programming concepts	

LIST OF EXPERIMENTS :

1.	Study of Electrical Symbols, Tools and Safety Precautions, Power Supplies.
2.	Study of Active and Passive elements – Resistors, Inductors and Capacitors, Bread Board.
3.	Verification of AC Voltage, Current and Power in Series and Parallel connection.
4.	Testing of DC Voltage and Current in series and parallel resistors which are connected in breadboard by using Voltmeter, Ammeter and Multimeter.
5.	Fluorescent lamp connection with choke.
6.	Staircase Wiring.
7.	Forward and Reverse bias characteristics of PN junction diode.
8.	Forward and Reverse bias characteristics of zener diode.
9.	Input and Output Characteristics of NPN transistor.
10.	Construction and verification of simple Logic Gates.
11.	Construction and verification of adders.
12.	Construction and verification of subtractor.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	**15**	**30**	**90**

TEXT BOOKS

1. Metha V.K., 2008. Principles of Electronics. Chand and Company.
2. Malvino, A. P., 2006. Electronics Principles. 7th ed. New Delhi: Tata McGraw-Hill.
3. Rajakamal, 2007. Digital System-Principle & Design. 2nd ed. Pearson education.
4. Morris Mano, 1999. Digital Design. Prentice Hall of India.
5. Ramesh, S. Gaonkar, 2000. Microprocessor Architecture, Programming and its Applications with the 8085. 4th ed. India: Penram International Publications.

REFERENCE BOOKS:

1. Corton,H.,2004. Electrical Technology. CBS Publishers & Distributors.
2. Syed, A. Nasar, 1998, Electrical Circuits. Schaum Series.
3. Jacob Millman and Christos, C. Halkias, 1967. Electronics Devices.New Delhi: McGraw-Hill.
4. Millman, J. andHalkias, C. C., 1972. Integrated Electronics: Analog and Digital Circuits and Systems. Tokyo: McGraw-Hill, Kogakusha Ltd.
5. Mohammed Rafiquzzaman, 1999. Microprocessors - Theory and Applications: Intel and Motorola. Prentice Hall International.

E-REFERENCES:

1. NTPEL, Basic Electrical Technology (Web Course), Prof. N. K. De, Prof. T. K. Bhattacharya and Prof. G.D. Roy, IIT Kharagpur.
2. Prof.L.Umanand, http://freevideolectures.com/Course/2335/Basic-Electrical-Technology#, IISc Bangalore.
3. http://nptel.ac.in/Onlinecourses/Nagendra/, Dr. Nagendra Krishnapura , IIT Madras.
4. Dr.LUmanand , http://www.nptelvideos.in/2012/11/basic-electrical-technology.html, IISC Bangalore.

Table: 1 Mapping of COs with POs:

	PO												**PSO**	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO 1	3	3	1	1	1	1	0	0	1	1	1	0	0	0
CO 2	3	3	1	1	1	1	0	0	1	1	1	0	0	0
CO 3	2	2	2	1	2	2	1	1	1	1	1	0	0	0
CO 4	2	2	1	1	1	1	1	1	1	1	1	0	0	0
CO 5	2	2	1	1	1	1	1	1	1	1	1	0	0	0
Total	12	12	6	5	6	6	3	3	5	5	5	0	0	0
Scaled value	3	3	2	1	2	2	1	1	1	1	1	0	0	0

1-5 → 1, 6-10 → 2, 11-15 → 3

0 – No relation, 1 – Low relation, 2 – Medium relation, 3 – High relation

COURSE CODE			XAP204	L	T	P	C
COURSE NAME			APPLIED PHYSICS FOR ENGINEERS	3	1	2	6
C	P	A		L	T	P	H
2.8	0.8	0.4		3	1	3	7

PREREQUISITE: Basic Physics in HSC level

	COURSE OUTCOMES	**Domain**	**Level**
CO1	***Identify*** the basics of mechanics, ***explain*** the principles of elasticity and ***determine*** its significance in engineering systems and technological advances.	Cognitive Psychomotor	Remember Understand Mechanism
CO2	***Illustrate*** the laws of electrostatics, magneto-statics and electromagnetic induction; ***use*** and ***locate*** basic applications of electromagnetic induction to technology.	Cognitive Psychomotor Affective	Remember Analyze Mechanism Respond
CO3	***Understand*** the fundamental phenomena in optics by measurement and ***describe*** the working principle and application of various lasers and fibre optics.	Cognitive Psychomotor Affective	Understand Apply Mechanism Receive
CO4	***Analyse*** energy bands in solids, ***discuss*** and ***use*** physics principles of latest technology using semiconductor devices.	Cognitive Psychomotor Affective	Understand Analyze Mechanism Receive
CO5	***Develop*** Knowledge on particle duality and ***solve*** Schrodinger equation for simple potential.	Cognitive:	Understand Apply

UNIT - I MECHANICS OF SOLIDS **9+3+9**

Mechanics: Force - Newton's laws of motion - work and energy - impulse and momentum - torque - law of conservation of energy and momentum - Friction.

Elasticity: Stress - Strain - Hooke's law - Stress strain diagram - Classification of elastic modulus - Moment, couple and torque - Torsion pendulum - Applications of torsion pendulum - Bending of beams - Experimental determination of Young's modulus: Uniform bending and non-uniform bending.

UNIT -II ELECTROMAGNETIC THEORY **9+3+3**

Laws of electrostatics - Electrostatic field and potential of a dipole; Dielectric Polarisation, Dielectric constant, internal field - Clausius Mossotti Equation - Laws of magnetism - Ampere's Faraday's law; Lenz's law - Maxwell's equation - Plane electromagnetic waves; their transverse nature - expression for plane, circularly and elliptically polarized light - quarter and half wave plates - production and detection of plane, circularly and elliptically polarized light.

UNIT –III OPTICS, LASERS AND FIBRE OPTICS **9+3+12**

Optics: Dispersion- Optical instrument: Spectrometer - Determination of refractive index and dispersive power of a prism- Interference of light in thin films: air wedge - Diffraction: grating.

LASER: Introduction - Population inversion -Pumping - Laser action - Nd-YAG laser - CO_2 laser - Applications

Fibre Optics: Principle and propagation of light in optical fibre - Numerical aperture and acceptance angle - Types of optical fibre - Fibre optic communication system (Block diagram).

UNIT –IV SEMICONDUCTOR PHYSICS	9+3+6

Semiconductors: Energy bands in solids - Energy band diagram of good conductors, insulators and semiconductors - Concept of Fermi level - Intrinsic semiconductors - Concept of holes - doping - Extrinsic semiconductors - P type and N type semiconductors - Hall effect.

Diodes and Transistors: P-N junction diode - Forward bias and reverse bias - Rectification action of diode - Working of full wave rectifier using P N junction diodes - PNP and NPN transistors - Three different configurations - Advantages of common emitter configuration - working of NPN transistor as an amplifier in common emitter configuration.

UNIT –V QUANTUM PHYSICS	9+3+0

Introduction to quantum physics, black body radiation, Compton effect, de Broglie hypothesis, wave – particle duality, uncertainty principle, Schrodinger wave equation (Time dependent and Time independent), particle in a box, Extension to three dimension - Degeneracy.

TEXT BOOKS

1. Gaur R. K. and Gupta S. L., "Engineering Physics", Dhanpat Rai Publications, 2009.
2. Avadhanulu M. N. "Engineering Physics" (Volume I and II), S. Chand & Company Ltd., New Delhi, 2010.

REFERENCE BOOKS

1. Palanisamy P. K., "Engineering Physics", Scitech Publications (India) Pvt. Ltd, Chennai.
2. Arumugam M., "Engineering Physics" (Volume I and II), Anuradha Publishers, 2010.
3. Senthil Kumar G., " Engineering Physics", 2nd Enlarged Revised Edition, VRB Publishers, Chennai, 2011.
4. Mani P., "Engineering Physics", Dhanam Publications, Chennai, 2007.

E RESOURCES

NPTEL , Engineering Physics, Prof. M. K. Srivastava, Department of Physics, IIT, Roorkee.

LABORATORY

1.	Torsional Pendulum - determination of moment of inertia and rigidity modulus of the given material of the wire.
2.	Uniform Bending - Determination of the Young's Modulus of the material of the beam.
3.	Non-Uniform Bending - Determination of the Young's Modulus of the material of the beam.
4.	Meter Bridge - Determination of specific resistance of the material of the wire.
5.	Spectrometer - Determination of dispersive power of the give prism.
6.	Spectrometer - Determination of wavelength of various colours in Hg source using grating.
7.	Air wedge - Determination of thickness of a given thin wire.
8.	Laser - Determination of wavelength of given laser source and size of the given micro particle using Laser grating.
9.	Post office Box - Determination of band gap of a given semiconductor.
10.	PN Junction Diode - Determination of V-I characteristics of the given diode.

REFERENCE BOOKS

1. Samir Kumar Ghosh, "A text book of Advanced Practical Physics", New Central Agency (P) Ltd, 2008.
2. Arora C.L., "Practical Physics", S. Chand & Company Ltd., New Delhi, 2013.
3. Umayal Sundari AR., "Applied Physics Laboratory Manual", PMU Press, Thanjavur, 2012.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL HOURS
Hours	**45**	**15**	**30**	**90**

Table 1: Mapping of CO's with PO:

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	2	2	1	0	0	0	1	0	0	1	0	0
CO2	3	0	1	0	1	0	0	0	0	0	0	1	0	0
CO3	3	2	2	2	1	0	0	0	1	0	0	1	0	0
CO4	3	2	2	2	1	0	0	0	1	0	0	1	0	0
CO5	3	0	2	0	0	0	0	0	0	0	0	1	0	0
Total	15	6	9	6	4	0	0	0	3	0	0	5	0	0
Scaled Value	3	2	2	2	1	0	0	0	1	0	0	1	0	0

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE			XEG 205	L	T	P	C
COURSE NAME			ENGINEERING GRAPHICS	2	0	1	3
C	P	A		L	T	P	H
1.75	1.0	0.25		2	0	2	4

PREREQUISITE: NIL

COURSE OUTCOMES:		Domain	Level
CO1	Apply the national and international standards, construct and practice various curves	Cognitive Psychomotor Affective	Applying Guided response Responds to Phenomena
CO2	Interpret, construct and practice orthographic projections of points, straight lines and planes.	Cognitive Psychomotor Affective	Understanding Mechanism Responds to Phenomena
CO3	Construct Sketch and Practice projection of solids in various positions and true shape of sectioned solids.	Cognitive Psychomotor Affective	Applying Complex Overt Response Responds to Phenomena
CO4	Interpret, Sketch and Practice the development of lateral surfaces of simple and truncated solids, intersection of solids.	Cognitive Psychomotor Affective	Understanding Complex Overt Response Responds to Phenomena
CO5	Construct sketch and practice isometric and perspective views of simple and truncated solids.	Cognitive Psychomotor Affective	Applying Complex Overt Response Responds to Phenomena

UNIT-I INTRODUCTION, FREE HAND SKETCHING OF ENGG OBJECTS AND CONSTRUCTION OF PLANE CURVE	**6+6**
Importance of graphics in engineering applications – use of drafting instruments – BIS specifications and conventions as per SP 46-2003. Pictorial representation of engineering objects – representation of three dimensional objects in two dimensional media – need for multiple views – developing visualization skills through free hand sketching of three dimensional objects. Polygons & curves used in engineering practice – methods of construction – construction of ellipse, parabola and hyperbola by eccentricity method – cycloidal and involute curves – construction – drawing of tangents to the above curves.	
UNIT –II PROJECTION OF POINTS, LINES AND PLANE SURFACES	**6+6**
General principles of orthographic projection – first angle projection – layout of views – projections of points, straight lines located in the first quadrant – determination of true lengths of lines and their inclinations to the planes of projection – traces – projection of polygonal surfaces and circular lamina inclined to both the planes of projection.	

UNIT-III PROJECTION OF SOLIDS AND SECTIONS OF SOLIDS	**6+6**
Projection of simple solids like prism, pyramid, cylinder and cone when the axis is inclined to one plane of projection – change of position & auxiliary projection methods – sectioning of above solids in simple vertical positions by cutting plane inclined to one reference plane and perpendicular to the other and above solids in inclined position with cutting planes parallel to one reference plane – true shapes of sections.	
UNIT - IV DEVELOPMENT OF SURFACES AND INTERSECTION OF SOLIDS	**6+6**
Need for development of surfaces – development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cones – development of lateral surfaces of the above solids with square and circular cutouts perpendicular to their axes – intersection of solids and curves of intersection –prism with cylinder, cylinder & cylinder, cone & cylinder with normal intersection of axes and with no offset.	
UNIT - V ISOMETRIC AND PERSPECTIVE PROJECTIONS	**6+6**
Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones – principles of perspective projections – projection of prisms, pyramids and cylinders by visual ray and vanishing point methods.	

THEORY 30	**PRACTICAL 30**	**TOTAL HRS 60**

TEXT BOOKS

1. Bhatt,N.D, "Engineering Drawing", Charotar Publishing House, 46th Edition-2003.
2. Natarajan,K.V, " A Textbook of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2006 .
3. Dr. P.K. Srividhya, P. Pandiyaraj, "Engineering Graphics", PMU Publications, Vallam, 2013

REFERENCES

1. Luzadder and Duff, "Fundamentals of Engineering Drawing" Prentice Hall of India PvtLtd, XI Edition - 2001.
2. Venugopal,K. and Prabhu Raja, V., "Engineering Graphics", New Age International(P) Ltd., 2008.
3. Gopalakrishnan.K.R,. "Engineering Drawing I & II", Subhas Publications, 1998.
4. Shah,M.B and Rana,B.C.,"Engineering Drawing", Pearson Education,2005.

E RESOURCES

1. http://periyarnet/Econtent
2. http://nptel.ac.in/courses/112103019/

Table 1: Mapping of CO's with PO'S:

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	2	3	2	3	1	1	2	3	3	3	-
CO2	3	3	3	1	3	1	3	1	1	1	2	3	3	-
CO3	3	3	3	1	3	1	3	1	1	1	2	3	3	-
CO4	3	3	3	1	3	1	3	1	1	1	2	3	3	-
CO5	3	3	3	1	3	1	3	1	1	1	2	3	3	-
Total	15	15	15	6	15	6	15	5	5	6	11	3	3	-
Scaled	3	3	3	2	3	2	3	1	1	2	3	3	3	-

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE			XMA301	L	T	P	C
COURSE NAME			PROBABILITY AND STATISTICS	3	1	0	4
C	P	A		L	T	P	H
4.0	0.0	0.0		3	1	0	4

PREREQUISITE: CALCULUS AND LINEAR ALGEBRA

COURSE OUTCOMES:

Course outcomes:		Domain	Level
CO1	**Explain** conditional probability, independent events, **find** expected values and Moments of Discrete random variables with properties.	Cognitive	Understanding Remembering
CO2	**Find** distribution function, Marginal density function, conditional density function, **define** density function of conditional distribution functions normal, exponential and gamma distributions.	Cognitive	Remembering
CO3	**Find** measures of central tendency and to **determine** tatistical parameters of Binomial, Poisson and Normal and to find correlation, regression and Rank Correlation coefficient of two variables.	Cognitive	Remembering
CO4	**Explain** large sample test for single proportion, difference of proportion, single mean, difference of means and difference of standard deviations with simple problems.	Cognitive	Understanding
CO5	**Explain** small sample test for single mean, difference of mean and correlation coefficients, variance test, chisquare test with simple Problems.	Cognitive	Understanding

UNIT I: BASIC PROBABILITY	**10**

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Chebyshev's Inequality.

UNIT II: CONTINUOUS PROBABILITY DISTRIBUTIONS	**10**

Continuous random varibales and their properties, distribution functions and densities, normal, exponential and gamma densities.

UNIT III: BIVARIATE DISTRIBUTIONS	**10**

Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

UNIT IV: BASIC STATISTICS	10
Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, normal and Poisson - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.	
UNIT V: APPLIED STATISTICS	**10**
Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.	
UNIT VI: SMALL SAMPLES	**10**
Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.	

	LECTURE	TUTORIAL	TOTAL
	45	15	60

Textbooks/References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
7. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

Cos Versus GA mapping

Table 1: Mapping of Cos with GAs:

	GA											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO 1	3	2	0	0	2	0	0	0	0	1	0	2
CO 2	3	1	0	0	0	0	0	0	0	1	0	1
CO 3	3	1	0	0	0	0	0	0	0	1	0	1
CO 4	3	2	0	0	0	0	0	0	0	1	0	1
CO 5	3	2	0	0	1	0	0	0	0	1	0	2
Total	15	8	0	0	3	0	0	0	0	5	0	7
Scaled Value	3	2	0	0	1	0	0	0	0	1	0	3

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO 1	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 2	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 3	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 4	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 5	3	2	1	1	2	1	0	0	0	0	0	1	1	1
Total	15	10	5	5	10	5	0	0	0	0	0	5	5	5
Scaled Value	3	2	1	1	2	1	0	0	0	0	0	1	1	1

$1 - 5 \rightarrow 1$, $6 - 10 \rightarrow 2$, $11 - 15 \rightarrow 3$

1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XCS302	L	T	P	C
COURSE NAME			ANALOG AND DIGITAL ELECTRONIC CIRCUITS	3	0	2	5
C	P	A		L	T	P	H
3.0	1.0	1.0		3	0	3	6

Course outcome		DOMAIN	LEVEL
CO1	***Classify*** and ***describe*** the basics of devices and discuss the applications	Cognitive Psychomotor	Understanding Set
CO2	A***pply*** op-amp concept to **analyze** and **design** the applications circuits	Cognitive Psychomotor	Understanding Remembering Set
CO3	***Apply*** the Boolean algebra to ***design*** the digital logic families	Cognitive Psychomotor	Understanding Mechanism
CO4	**Describe** and **design** the Combinational digital circuits	Cognitive Psychomotor Affective	Understanding Remembering Set Respond
CO5	***Discuss*** and **design** the Sequential digital circuits	Cognitive Psychomotor Affective	Understanding Remembering Set Respond

COURSE CONTENT		Hours
UNIT I	**SEMICONDUCTOR DEVICES AND CIRCUITS**	9 + 6
	Basics and characteristics – p-n junction diode, Zener diode, BJT and MOSFET – applications, rectifier, clipper, clamper and amplifier circuits. Differential amplifier and Direct coupled Multistage amplifier. **List of Experiments:** 1. Design and implementation of rectifiers, clipper and Clamper Circuits 2. Design and implementation of amplifier circuits.	
UNIT II	**LINEAR AND NON LINEAR APPLICATIONS OF OP-AMP**	9 + 6

	Introduction to op-amp-Linear applications; Inverting and non-inverting amplifier, differential amplifier, Integrator, active filter, voltage regulator, Wein bridge and Phase shift oscillators Nonlinear applications; Comparator, Zero crossing Detector, wave and triangular wave generators. **List of Experiments** 3. Design and implementation of Op-amp linear applications. 4. Design and implementation of Op-amp non-linear applications	
UNIT III	**FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES**	**9 + 6**
	Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive –OR operations, Boolean algebra, examples of IC gates. Number Systems – binary, signed binary, octal and hexadecimal number-arithmetic calculation-digital logic families; TTL, Schottky TTL and CMOS logic. A/D and D/A converter. List of Experiments: 5. Verification of Boolean theorems using digital logic gates.	
UNIT IV	**COMBINATIONAL DIGITAL CIRCUITS**	**9 + 6**
	Standard representation for logic function, K-map representation, Multiplexer, Demultiplexer, Adders, Subtractors, Digital comparator and code converters. List of Experiments: 6. Design and implementation of combinational circuits using basic gates for code converters. 7. Design and implementation of binary adder / subtractor using basic gates. 8. Design and implementation of Multiplexers/Demultiplexers.	
UNIT V	**SEQUENTIAL DIGITAL CIRCUITS,MEMORIES AND PLD**	**9 + 6**
	Sequential digital circuits; Flipflops-SR, J-K, T and D flip flops-Shift Register types and applications-Counters types and applications. Memory organization and operation, expanding memory size, classification and characteristics of memories, read only memory, random access memory, addressable memory, PLD (Programmable Logic Device). Memory and List of Experiments: 9. Design and implementation of Shift registers. 10. Design and implementation of counters.	

		LECTURE	**PRACTICAL**	**TOTAL**	
		45	45	90	

TEXT BOOKS / REFERENCE BOOKS

1. R.L.Boylestad, L. Nashelsky, Electronic devices, and circuit theory, Prentice Hall, 2002
2. A.S.Sedra and K.C.Smith,"Microelectronic Circuits",New York, Oxford University Press, 7th edition
3. R.P.Jain,"Modern Digital Electronics", McGraw Hill Education,2009
4. M.M. Mano,"Digital logic and Computer design",Pearson Education India,2016.
5. A.Kumar 'Fundamentals of Digital circuits",Prentice hall India,2016.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	1	1	1	1	1	1	1	1	0	0	0	0	2	0
CO2	1	1	1	1	1	1	1	1	0	0	0	0	2	0
CO3	3	3	3	2	3	3	3	1	0	0	0	0	3	1
CO4	3	3	3	2	3	3	3	1	0	0	0	0	3	1
CO5	3	3	3	2	3	3	3	1	0	0	0	0	3	1

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE			XCS303	L	T	P	C
COURSE NAME			DATA STRUCTURE AND ALGORITHMS	3	1	1	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	1	2	6

Course outcome		Domain	Level
CO1	*Understand* and *apply* linear data structures	Cognitive Psychomotor	Understand Apply Guided Response
CO2	*Understand* and *apply* nonlinear data structures	Cognitive Psychomotor	Understand Apply Guided Response
CO3	*Understand* and *apply* sorting techniques	Cognitive Psychomotor	Understand Apply Guided Response
CO4	*Understand* and *apply* graph algorithms	Cognitive Psychomotor	Understand Apply Guided Response
CO5	*Design* different algorithm techniques.	Cognitive	Understand Apply

COURSE CONTENT		Hours
UNIT I	**LINEAR DATA STRUCTURE**	12 + 12
	Theory ADT – List ADT – Stack ADT – Queue ADT. **Practical** 1. Singly Linked List 2. Doubly linked List 3. Circular Linked List 4. Stack Using Array implementation 5. Queue Using Array Implementation 6. Program for Balancing symbol 7. Program for Postfix expression evaluation	
UNIT II	**NON LINEAR DATA STRUCTURE**	12 + 6
	Theory Trees – Binary Trees – Binary Search Trees – AVL Trees – Splay Trees – Tree Traversal – B Trees- B+ Tree **Practical** 8. Binary Search Tree	

UNIT III	**SORTING**	**12 + 6**
	Theory Insertion sort – Shell sort – Heap sort – Merge sort – Quick sort – Bucket sort – External Sorting **Practical** 9. Insertion Sort 10. Heap Sort 11. Merge Sort 12. Quick Sort	
UNIT IV	**GRAPH ALGORITHMS**	**12 + 6**
	Theory Topological sort – Shortest path algorithms – Network Flow problems – Minimum Spanning Tree – Applications of Depth First search – NP completeness. **Practical** 13. Dijkstra's Algorithm	
UNIT V	**ALGORITHM DESIGN TECHNIQUES**	**12**
	Theory Greedy Algorithms – Divide and Conquer – Dynamic Programming - Randomized Algorithms – Backtracking algorithms	

LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
45	**15**	**30**	**90**

TEXT BOOKS /REFERENCE BOOKS

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, Reprint 2011.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002
3. Reema Thareja, "Data Structures Using C", Oxford University Press, 2011
4. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
5. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	1	1	1	1	0	0	0	1	0	1	1	3	2
CO2	3	2	1	1	1	0	0	0	1	0	1	1	3	2
CO3	3	1	1	1	1	0	0	0	1	0	1	1	3	2
CO4	3	2	1	2	1	0	0	0	1	0	1	1	3	2
CO5	3	1	1	2	0	0	0	0	0	0	1	2	3	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE			XCS304	L	T	P	C
COURSE NAME			DESIGN AND ANALYSIS OF ALGORITHMS	3	0	2	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	3	6

Course Outcome

		Domain	Level
CO1	Explain and classify the characteristics and analysis of algorithm and propose the correct algorithmic strategy to solve any problem.	Cognitive	Understanding
CO2	Design algorithms for any problem based on the strategy and sorting and searching problems.	Cognitive Psychomotor	Apply Guided Response
CO3	Analyze any given algorithm and express its complexity in asymptotic notation	Cognitive Psychomotor	Analyze Guided Response
CO4	Explain the limitations of algorithm and Identify any problem as belonging to the class of P, NP-Complete or NP-Hard	Cognitive Psychomotor	Understand Guided Response
CO5	Propose approximation algorithm for any NP problem	Cognitive Psychomotor	Analyze Guided Response

COURSE CONTENT		Hours
UNIT I	**ANALYSING ALGORITHMS**	**9**
	Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior - Performance measurements of Algorithm, Time and space trade-offs - Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem. The Role of Algorithms in Computing - Growth of Functions – Recurrences - The Substitution Method - The Recurrence Tree Method - The Master Method - Probabilistic Analysis and Randomized Algorithms – Amortized Analysis – Aggregate Analysis – Accounting Method.	
UNIT II	**DIVIDE AND CONQUER & GREEDY DESIGN STRATEGIES**	**10 + 12**
	Fundamental Algorithmic Strategies: Brute-Force, Greedy,Dynamic Programming, Branch and-Bound and Backtracking methodologies for the design of algorithms - Topological sorting - Analysis of Sorting Algorithm – Quick Sort, Merge Sort – Quick Sort Randomized Version – Sorting in Linear Time - Lower Bounds for Sorting - Selection in Expected Linear Time - Selection in Worst case Linear Time – Greedy Algorithms - Elements of Greedy Strategy - Huffman Code, Dijkstra's Shortest Path Algorithm – Heuristics - characteristics and their application domains. **List of Experiments:** 1. Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number	

	generator. 2. Using OpenMP, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the **time** required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. 3. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.	
UNIT III	**DYNAMIC PROGRAMMING AND OTHER DESIGN STRATEGIES**	**9 + 12**
	Dynamic Programming – Matrix Chain Multiplication - Elements of Dynamic programming –Longest Common Sequences – Warshall‘s and Floyds Algorithm – Transitive Closure – Minimum Spanning Tree - All Pairs Shortest Path Algorithm – Analysis – Backtracking – Graph Coloring Problem – Branch and Bound Strategy - Knapsack Problem - Kruskal's algorithm – Prims algorithm. **List of Experiments:** 4. Compute the transitive closure of a given directed graph using Warshall's algorithm. 5. Obtain the Topological ordering of vertices in a given digraph. 6. Implement 0/1 Knapsack problem using Dynamic Programming. 7. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm. 8. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using OpenMP and determine the speed-up achieved. 9. Implement N Queen's problem using Back Tracking. 10. Implement the spanning tree algorithm using Prims Algorithm	
UNIT IV	**FLOW NETWORKS AND STRING MATCHING**	**8 + 12**
	Flow Networks – Network Flow Algorithm - Ford Fulkerson Method - String Matching - Naive String Matching Algorithm – Knuth Morris Pratt Algorithm - Analysis. **List of Experiments:** 11. Implement the Ford-Fulkerson Algorithm for Maximum Flow Problem. 12. Implement the Knuth Morris Pratt Algorithm	
UNIT V	**NP PROBLEMS**	**9 + 9**
	NP-Completeness – Polynomial Time Verification – Theory of Reducibility – Circuit Satisfiability – NP - Completeness Proofs – NP Complete Problems: Vertex Cover, Hamiltonian Cycle and Traveling Salesman Problems - Cook’s theorem– Approximation Algorithms – Approximation Algorithms to Vertex - Cover and Traveling Salesman Problems - Randomized algorithms - Class of problems beyond NP – P SPACE. **List of Experiments:** 13.Implement travelling salesman problem using the dynamic programming approach. 14.Implement the Hamiltonian Cycle using the dynamic programming approach.	

		LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**	
		45	**15**	**30**	**90**	

TEXT BOOKS /REFERENCE BOOKS

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Cliford Stein, Introduction to Algorithms, Third Edition, Prentice Hall, 2010.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms Second Edition, Universities Press, 2008.
3. Kenneth A. Berman and Jerome L. Paul,Algorithms, Cengage Learning India, 2010.
4. Alfred V Aho, John E Hopcroft and Jeffrey D Ullman,The Design and Analysis of Computer Algorithms, First Edition, Pearson Education, 2006
5. Ding-Zhu Du, Ker-I Ko,Xiaodong Hu, Design and Analysis of Approximation Algorithms, Springer Optimization and Its Applications, First Edition, 2011.
6. I.Zámecnikova, J.Hromkovic, Design and Analysis of Randomized Algorithms: Introduction to Design Paradigms (Texts in Theoretical Computer Science. An EATCS Series), 2005.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PROGRAM OUTCOMES												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	2	1	0	0	0	0	1	0	0	1	1	1
CO2	2	3	2	1	1	0	0	0	0	0	1	1	2	2
CO3	2	3	2	1	1	0	0	0	1	0	1	1	2	3
CO4	3	2	2	1	1	1	1	0	1	0	0	0	2	3
CO5	2	2	2	1	1	1	1	0	1	0	0	1	1	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE			XES306	L	T	P	C
COURSE NAME			ENTREPRENEURSHIP DEVELOPMENT	3	0	0	3
C	P	A		L	T	P	H
3.0	0.0	1.0		3	0	0	3

COURSE OUTCOME		Domain	Level
CO1	***Recognise*** and ***describe*** the personal traits of an entrepreneur.	Cognitive Affective	Understand Receiving
CO2	***Determine*** the new venture ideas and ***analyze*** the feasibility report.	Cognitive	Understand Analyze
CO3	***Develop*** the business plan and ***analyze*** the plan as an individual or in team.	Cognitive Affective	Receiving Analyze
CO4	***Describe*** various parameters to be taken into consideration for launching and managing small business.	Cognitive	Understand
CO5	***Describe*** Technological management and Intellectual Property Rights	Cognitive	Understand

UNIT I ENTREPRENEURIAL TRAITS AND FUNCTIONS	9
Definition of Entrepreneurship; competencies and traits of an entrepreneur; factors affecting Entrepreneurship Development; Role of Family and Society ; Achievement Motivation; Entrepreneurship as a career and national development.	
UNIT -II NEW PRODUCT DEVELOPMENT AND VENTURE CREATION	**9**
Ideation to Concept development; Sources and Criteria for Selection of Product; market assessment ; Feasibility Report ;Project Profile; processes involved in starting a new venture; legal formalities; Ownership; Case Study.	
UNIT –III ENTREPRENEURIAL FINANCE	**9**
Financial forecasting for a new venture; Finance mobilization; Business plan preparation; Sources of Financing, Angel Investors and Venture Capital; Government support in startup promotion.	
UNIT –IV LAUNCHING OF SMALL BUSINESS AND ITS MANGEMENT	**9**
Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units.	
UNIT–V TECHNOLOGY MANAGEMENT, IPR PORTFOLIO FOR NEW PRODUCT VENTURE	**9**
Technology management; Impact of technology on society and business; Role of Government in supporting Technology Development and IPR protection; Entrepreneurship Development Training and Other Support Services.	

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS

- Hisrich, 2016, *Entrepreneurship*, Tata McGraw Hill, New Delhi.
- S.S.Khanka, 2013, *Entrepreneurial Development*, S.Chand and Company Limited, New Delhi.

REFERENCE BOOKS

- Mathew Manimala, 2005, *Entrepreneurship Theory at the Crossroads, Paradigms & Praxis*, Biztrantra ,2nd Edition.
- Prasanna Chandra, 2009, *Projects – Planning, Analysis, Selection, Implementation and Reviews*, Tata McGraw-Hill.
- P.Saravanavel, 1997, *Entrepreneurial Development*, Ess Pee kay Publishing House, Chennai.
- Arya Kumar,2012, *Entrepreneurship: Creating and Leading an Entrepreneurial Organisation*, Pearson Education India.
- Donald F Kuratko, T.V Rao, 2012, *Entrepreneurship: A South Asian perspective*, Cengage Learning India.
- Dinesh Awasthi, Raman Jaggi, V.Padmanand, *Suggested Reading / Reference Material for Entrepreneurship Development Programmes* (EDP/WEDP/TEDP), EDI Publication, Entrepreneurship Development Institute of India, Ahmedabad. Available from: http://www.ediindia.org/doc/EDP-TEDP.pdf

WEB SITES AND WEB RESOURCES:

- Jeff Hawkins, " Characteristics of a successful entrepreneur", ALISON Online entrepreneurship courses, "https://alison.com/learn/entrepreneurial-skills
- Jeff Cornwall, "Entrepreneurship -- From Idea to Launch", Udemy online Education, https://www.udemy.com/entrepreneurship-from-idea-to-launch/

TABLE :1 MAPPING COURSE OUTCOME WITH GRADUATE ATTRIBUTES:

Course Outcomes	GA											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	0	0	0	0	0	0	0	0	3	3	3	1
CO2	0	0	1	2	3	2	1	1	1	2	3	0
CO3	0	0	0	0	0	1	0	2	3	3	0	2
CO4	0	0	0	0	0	1	1	2	3	0	3	3
CO5	0	0	0	0	0	1	1	3	0	0	0	3
Total	0	0	1	2	3	5	3	8	10	8	9	9
Scaled Value			1	1	1	2	1	2	3	2	2	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3
1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE			XCI 307	L	T	P	C
COURSE NAME			CONSTITUTION OF INDIA	3	0	0	3
C	P	A		L	T	P	H
3.0	0.0	0.0		3	0	0	3

COURSE OUTCOME		Domain	Level
CO1	***Understand*** the Constitutional History	Cognitive	Understanding
CO2	***Understand*** the Powers and Functions	Cognitive	Understanding
CO3	***Understand*** the Legislature	Affective	Remembering
CO4	***Understand*** the Judiciary	Affective	Remembering
CO5	***Understand*** the Centre State relations	Cognitive	Understanding

UNIT I **08**

Constitutional History- The Constitutional Rights- Preamble- Fundamental Rights- Fundamental Duties- Directive principles of State Policy.

UNIT II **09**

The Union Executive- The President of India (powers and functions)- Vice-President of India-The Council of Ministers-Prime Minister- Powers and Functions.

UNIT III **10**

Union Legislature- Structure and Functions of Lok Sabha- Structure and Functions of Rajya Sabha- Legislative Procedure in India- Important Committes of Lok Sabha- Speaker of the Lok Sabha.

UNIT IV **09**

The Union Judiciary- Powers of the Supreme Court- Original Jurisdiction- Appelete jurisdictions- Advisory Jurisdiction- Judicial review.

UNIT V **09**

Centre State relations- Political Parties- Role of governor, powers and functions of Chief Minister- Legislative Assembly- State Judiciary- Powers and Functions of the High Courts.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	0	0	45

REFERENCES

1. W.H.Morris Shores- Government and politics of India, NewDelhi,B.1.Publishers,1974.
2. M.V.Pylee- Constitutional Government in India, Bombay, Asia Publishing House, 1977.
3. R.Thanker- The Government and politics of India, London:Macmillon, 1995.
4. A.C.Kapur- Select Constitutions S,Chand & Co.,NewDelhi, 1995
5. V.D.Mahajan- Select Modern Governments,S,Chand &Co, NewDelhi,1995.
6. B.C.Rout- Democractic Constitution of India.
7. Gopal K.Puri- Constitution of India, India 2005.

Table 1: Mapping of COs with POs

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	2	0	0	1	0	0	0	0	0	0	0	0	0	0
CO 2	2	0	0	1	0	0	0	0	0	0	0	0	0	0
CO 3	2	0	0	1	0	0	0	0	1	0	0	0	0	0
CO 4	2	0	0	1	0	0	0	1	1	0	0	0	0	0
CO 5	2	2	0	1	0	0	0	1	1	0	0	0	0	0
Total	10	2	0	5	0	0	0	2	3	0	0	0	0	0
Scaled Value	2	1	0	1	0	0	0	1	1	0	0	0	0	0

1-5 →1, 6-10 →2, 11-15 →3

1- Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XMA401	L	T	P	C
COURSE NAME			DISCRETE MATHEMATICS	3	1	0	4
C	P	A		L	T	P	H
4	0	0		3	1	0	4

PREREQUISITE: CALCULUS AND LINEAR ALGEBRA

COURSE OUTCOMES		Domain	Level
CO1	**Define and Explain** Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets.	Cognitive	Remembering Understanding
CO2	**Define and Explain** Basic counting techniques- inclusion and exclusion, pigeon-hole principle, permutation and combination.	Cognitive	Remembering Understanding
CO3	**Define and Explain** The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers.	Cognitive	Remembering Understanding
CO4	**Define and Explain** Algebraic Structures with one Binary Operation and two Binary Operations.	Cognitive	Remembering Understanding
CO5	**Define and Explain** Graphs and their properties.	Cognitive	Remembering Understanding

UNIT I: SETS, RELATION AND FUNCTION — **12**

Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction:

The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT II: — **12**

Basic counting techniques- inclusion and exclusion, pigeon-hole principle, permutation and combination.

UNIT III: PROPOSITIONAL LOGIC — **12**

Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

UNIT IV: ALGEBRAIC STRUCTURES AND MORPHISM	12

Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.

UNIT V: Graphs and Trees	12

Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

	LECTURE	TUTORIAL	TOTAL
	45	15	60

SUGGESTED BOOKS:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2. Susanna S. Epp, Discrete Mathematics with Applications,4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

SUGGESTED REFERENCE BOOKS:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, Tata Mcgraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill

Cos Versus GA mapping

Table 1: Mapping of Cos with GAs:

	GA											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	2	0	0	2	0	0	0	0	1	0	2
CO 2	3	1	0	0	2	0	0	0	0	1	0	2
CO 3	3	1	0	0	1	0	0	0	0	1	0	2
CO 4	3	2	0	0	1	0	0	0	0	1	0	2
CO 5	3	2	0	0	1	0	0	0	0	1	0	2
Total	15	8	0	0	7	0	0	0	0	5	0	10
Scaled Value	3	2	0	0	2	0	0	0	0	1	0	2

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 2	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 3	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 4	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 5	3	2	1	1	2	1	0	0	0	0	0	1	1	1
Total	15	10	5	5	10	5	0	0	0	0	0	5	5	5
Scaled Value	3	2	1	1	2	1	0	0	0	0	0	1	1	1

$1 - 5 \rightarrow 1$, $6 - 10 \rightarrow 2$, $11 - 15 \rightarrow 3$

0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XCS402	L	T	P	C
COURSE NAME			COMPUTER ORGANIZATION AND ARCHITECTURE	3	0	2	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	3	6

		Domain	Level
CO1	***Describe*** functional unit of computer and ***Recognize*** various Addressing modes.	Cognitive Psychomotor	Remember, Understand Guided Response
CO2	***Describe and Analyze*** of arithmetic unit.	Cognitive Psychomotor	Remember, Analyze Guided Response
CO3	***Describe*** and ***Recognize*** the basic processing unit.	Cognitive Psychomotor	Remember, Understand Guided Response
CO4	***Explain*** and ***Illustrate*** the memory System.	Cognitive Psychomotor	Remember, Analyze Guided Response
CO5	***Explain and Analyze*** the I/O Organization.	Cognitive Psychomotor	Remember, Analyze Guided Response

COURSE CONTENT		Hours
UNIT I BASIC STRUCTURE OF COMPUTERS		**9+10**
	Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues- Measuring, Reporting and Summarizing Performance – Quantitative principles of computer design **Practical:** 1. String Manipulations, Sorting And Searching- Ascending & Descending Largest & Smallest.	
UNIT II ARITHMETIC UNIT		**9+10**
	Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations.	

	Practical: 3.16 Bit Arithmetic Operation a. Addition b. Subtraction c. Multiplication d. Division 4. Logical Operations.				
UNIT III BASIC PROCESSING UNIT					**9**
	Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control. Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.				
UNIT IV MEMORY SYSTEM					9+12
	Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage. **Practical:** Simulate the mapping techniques of Cache memory 5. Direct Mapped cache 6. Associative Mapped cache 7. Set Associative Mapped cache.				
UNIT V I/O ORGANIZATION					9+13
	Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB). **Practical:** 8. Traffic light control 9. Stepper motor control 10.Key board and Display				
		LECTURE	**PRACTICAL**	**TOTAL**	
		45	**45**	**90**	

TEXT BOOKS /REFERENCE BOOKS

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 6th Edition “Computer Organization”, McGraw-Hill, 2012.
2. John L. Hennessey and David A. Patterson," Computer Architecture: A Quantitative Approach", 5th Edition, Morgan Kaufmann, 2011
3. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 9th Edition, Pearson Education, 2010
4. John P.Hayes, “Computer Architecture and Organization”, 3rd Edition, McGraw Hill,1998

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	2	2	1	1	0	0	0	2	2	3	1
CO2	3	2	3	1	2	1	2	0	0	0	1	1	3	1
CO3	3	2	2	2	2	1	1	0	0	0	3	1	3	1
CO4	3	2	2	1	2	1	1	0	0	0	1	1	3	1
CO5	3	2	3	2	1	1	1	0	0	0	2	1	3	1
Total	15	10	13	8	9	5	6	0	0	0	9	6	15	5

$1 - 5 \rightarrow 1$, $6 - 10 \rightarrow 2$, $11 - 15 \rightarrow 3$

0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XCS403	L	T	P	C
COURSE NAME			OPERATING SYSTEMS	3	0	2	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	3	6

COURSE OUTCOME		Domain	Level
CO1	***Understand*** the fundamental concepts of Operating system	Cognitive Psychomotor	Remembering Understand
CO2	***Understand*** and ***implement the*** process management, CPU scheduling algorithms, threads and Real time scheduling.	Cognitive Psychomotor	Understand Apply
CO3	***Understand*** and ***implement*** recognize the inter-process communication, synchronization and deadlocks.	Cognitive Psychomotor	Understand Apply
CO4	***Understand*** and ***implement*** the ***memory*** management techniques.	Cognitive Psychomotor	Understand Apply
CO5	***Understand*** the concepts of storage management, Disk Management and file management.	Cognitive Psychomotor	Understand

COURSE CONTENT		Hours
UNIT I OPERATING SYSTEMS OVERVIEW		**9 + 9**
	Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System. **Practical** 1. Basic Commands in Linux 2. Write programs using the process related system calls of UNIX operating system like fork, exec, exit, wait, getuid, geteuid, close, kill etc... 3. Write C programs to simulate UNIX commands like ls, grep, etc…	
UNIT II PROCESS MANAGEMENT		**9+9**
	Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads **Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor **Scheduling:** Real Time scheduling: RM and EDF.	

	Practical 4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc) 5. Implement the various scheduling algorithms like FCFS and SJF scheduling, Priority and Round robin scheduling.	
UNIT III INTER-PROCESS COMMUNICATION		**9+9**
	Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson' Solution, The Producer\Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc. **Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery. **Practical** 6. Simulate Inter Process Communication 7. Implement the semaphores like Producer – Consumer problem 8. Implementation of Banker's Algorithm	
UNIT IV MEMORY MANAGEMENT		**9+9**
	Memory Management: Basic concept,Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of Operation – Page allocation– Hardware support for paging, Protection and sharing, Disadvantages of paging. **Virtual Memory:** Basics of Virtual Memory– Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not Recently used (NRU) and Least Recently used (LRU). **Practical** 9. Implementation of Memory Management Scheme- Paging a. Implementation of Best Fit algorithm b. Implementation of First Fit Algorithm c. Implement the contiguous file allocation technique d. Implementation of FIFO Page Replacement Algorithm e. Implementation of LRU Page Replacement Algorithm	
UNIT V I/O SYSTEMS		**9+9**
	I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms. **Disk Management:** Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks. **File Management:** Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed),	

	Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance. **Practical** 11. Simulate Storage Features using virtual box component				
		LECTURE	**PRACTICAL**	**TOTAL**	
		45	**45**	**90**	

TEXT BOOKS /REFERENCE BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.
2. William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011
3. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education, 1996.
4. Gary J. Nutt ,"Operating Systems: A Modern Perspective", 2nd Edition, Addison-Wesley,2000
5. Maurice Bach ,"Design of the Unix Operating Systems", 8th Edition, Prentice-Hall of India,2012
6. Daniel P. Bovet, Marco Cesati, "Understanding the Linux Kernel", 3rd Edition, , O'Reilly and Associates,2005

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PROGRAM OUTCOMES												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1	3	0	0	0	0	0	1	0	0	1	3	1
CO2	3	3	3	1	0	0	0	0	0	0	1	2	3	1
CO3	2	3	3	1	1	0	0	0	1	0	1	2	3	1
CO4	3	2	0	1	1	1	1	0	1	0	0	2	3	1
CO5	3	2	0	1	1	1	1	0	1	0	0	2	3	1

$1 - 5 \rightarrow 1$, $6 - 10 \rightarrow 2$, $11 - 15 \rightarrow 3$

1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XCS404	L	T	P	C
COURSE NAME			OBJECT ORIENTED PROGRAMMING	3	0	1	4
C	P	A		L	T	P	H
3.0	0.5	0.5		3	0	2	5

COURSE OUTCOME		Domain	Level
CO1	To **u*nderstand*** the basic concepts of OOP and classes and objects in C++.	Cognitive Psychomotor Affective	Understand Guided Response Set
CO2	To ***develop*** *a* solution to problems and demonstrating the ***usage*** of file handling in C++.	Cognitive, Psychomotor Affective	Apply Create Guided Response Set
CO3	To **u*nderstand*** the basic concepts of OOP in Java and design patterns.	Cognitive Psychomotor Affective	Understand Guided Response Set
CO4	To ***apply*** the ability to program with Multithreading and Exception handling in java.	Cognitive Psychomotor Affective	Understand Apply Guided Response Set
CO5	To ***demonstrate*** the ability to ***develop*** a solution to various I/O manipulation operations and connectivity to database.	Cognitive Psychomotor Affective	Understand Apply Guided Response Set

COURSE CONTENT	Hours
UNIT- I PROGRAMMING IN C++	**9 + 6**
C++ fundamentals, Classes and objects, Abstract data types, ADT implementation- Concrete state space- concrete invariant- abstraction function. Implementing operations Constructors and destructors, operator overloading – inheritance, functions and polymorphism. **List of Experiments:** 1. Design C++ classes with static members, methods with default arguments, friend functions. 2.Implement complex number class with necessary operator overloading and type conversions such as integer to complex, double to complex, complex to double etc.	
UNIT - II FILE HANDLING IN C++	**9 + 6**
C++ streams – console streams – console stream classes-formatted and unformatted console I/O operations, manipulators - File streams - classes file modes file pointers and manipulations file I/O – Exception handling. **List of Experiments:** 3. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor, and overloading of assignment operator. 4. Overload the new and delete operators to provide custom dynamic allocation of memory.	

UNIT - III JAVA INTRODUCTION & DESIGN PATTERNS					**9 + 6**
Design patterns. Introduction and classification. The iterator pattern. - Model-view-controller pattern. Introduction to java, data types, variables and arrays, operators, control statements, classes, objects, methods, Memory management. **List of Experiments:** 5. Simple Java applications - For understanding reference to an instance of a class (object), methods - Handling Strings in Java - Constructor in Java					
UNIT- IV JAVA INTRODUCTION & PROGRAMMING					**9 + 6**
Inheritance Packages and Interfaces, Exception handling Strings, Input /Output, Multithreading – interrupting threads – thread states – thread priorities – thread synchronization – Executors. **List of Experiments:** 6. Simple Package creation. - Developing user defined packages in Java 7. Interfaces - Developing user-defined interfaces and implementation - Use of predefined interfaces 8. Exception Handling Mechanism in Java - Handling pre-defined exceptions					
UNIT V FILE HANDLING IN JAVA					
	Files - streams - byte streams, character streams, text input/output, binary input/output, random access file operations, File management using File class. Connecting to a database using JDBC **List of Experiments:** 9. Program to implement streaming models 10. Program to implement JDBC Connectivity 11. Create a GUI interface program using scala.				**9 + 6**
		LECTURE	**PRACTICAL**	**TOTAL**	
		45	**30**	**75**	

TEXT BOOKS /REFERENCE BOOKS

1. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003
2. Bjarne Stroustrup, "The C++ programming language", Addison Wesley, 2000
3. Herbet Schidt and Dale Srien, "Java Fundamentals - A comprehensive Introduction", TMH.
4. Herbert Schildt, "The Complete Reference (Fully updated for jdk7)", Oracle press 8th Edition, 2012
5. Barbara Liskov, Program Development in Java, Addison-Wesley, 2001
6. Java for Programmers, P.J. Deitel and H.M. Deitel, Pearson education
7. Java: How to Program P.J. Deitel and H.M. Deitel, PHI.
8. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
9. Thinking in Java, Bruce Eckel, Pearson Education
10. Ira Pohl, "Object oriented programming using C++", Pearson Education Asia, 2003
11. John R.Hubbard, "Programming with C++", Schaums outline series, TMH, 2003
12. E.Balagurusamy " Object Oriented Programming with C++", TMH 2/e
13. Cay S.Horstmann and Gary Cornel, "Core Java Programming Volume – I", 9th Edition, 2012.
14. Programming in Java, Bruce Eckel, Pearson Education
15. Programming in Java, S. Malhotra and S. Choudhary, Oxford Univ. Press.
16. Deitel & Deitel, "Java How to Program", Prentice Hall, 9th Edition, 2012

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3	2	2	2	1	0	0	2	1	1
CO2	3	3	3	3	3	2	2	2	1	0	0	2	1	1
CO3	2	2	2	3	3	3	2	2	1	0	0	1	2	1
CO4	2	2	2	2	0	0	0	0	0	0	0	0	2	1
CO5	3	2	3	3	3	0	2	2	2	0	0	0	1	1

$1 - 5 \rightarrow 1$, $6 - 10 \rightarrow 2$, $11 - 15 \rightarrow 3$

1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XUM405	L	T	P	C
COURSE NAME			TOTAL QUALITY MANAGEMENT	3	0	0	3
C	P	A		L	T	P	H
3.0	0.0	0.0		3	0	0	3

Course outcome

		Domain	Level
CO1	***List*** and ***Explain*** the basic concepts of total quality concepts and its limitations.	Cognitive	Remembering, Understanding
CO2	***Analyze*** and ***Explain*** the Customer satisfaction, Employee involvement, supplier selection and appraise the performance by TQM principle.	Cognitive	Analyzing Evaluating
CO3	***Explain*** and ***Apply*** the Statistical Process Control Tools.	Cognitive	Understanding, Applying
CO4	***Select*** and ***Explain*** the different TQM tools and their significance.	Cognitive	Remembering, Understanding
CO5	***Explain*** the importance aspects of different quality systems	Cognitive	Understanding

COURSE CONTENT		Hours
UNIT I INTRODUCTION		**9**
	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	
UNIT II TQM PRINCIPLES		**9**
	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.	
UNIT III STATISTICAL PROCESS CONTROL (SPC)		**9**
	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.	

UNIT IV TQM TOOLS		**9**
	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.	
UNIT V QUALITY SYSTEMS		**9**
	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.	

LECTURE	**TUTORIAL**	**TOTAL**
45	**0**	**45**

TEXT BOOKS

1.Dale H. Besterfiled, et. Al. "Total Quality Management", New Delhi, Pearson Education, Inc.. 2007.
2.James R. Evans and William M. Lidsay, "The Management and Control of Quality", 5th Edition, South-Western, 2002.

REFERENCES

1. Feigenbaum, A.V., "Total Quality Management", McGraw Hill, 1991.
2. Oakland, J.S., "Total Quality Management", Butterworth Heineman, 1989.
3. Narayana V. and Sreenivasan, N.S., "Quality Management – Concepts and Tasks", New Age International, 1996.
4. Zeiri, "Total Quality Management for Engineers", Wood Head Publishers, 1991.

E- REFERENCES

http://nptel.ac.in/faq/110101010/Prof.IndrajitMukherjee,IIT,Bombay and Prof.Tapan P.Bagchi, IIT, Kharagpur.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	0	0	0	0	0	2	1	3	2	1	2	1	1	0
CO2	0	0	0	0	0	2	1	3	2	1	2	1	1	0
CO3	0	0	0	0	0	2	1	3	2	1	2	1	1	0
CO4	0	0	0	0	0	2	1	3	2	1	2	1	1	0
CO5	0	0	0	0	0	2	1	3	2	1	2	1	1	0
Total	0	0	0	0	0	10	5	15	10	5	10	5	5	0
Scaled	0	0	0	0	0	2	1	3	2	1	3	1	1	0

$1 - 5 \rightarrow 1$, $6 - 10 \rightarrow 2$, $11 - 15 \rightarrow 3$

1 - Low Relation, 2- Medium Relation, 3- High Relation