

## Department of Computer Science and Engineering

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## FACULTY OF COMPUTING SCIENCES AND ENGINEERING

### B.TECH. - COMPUTER SCIENCE AND ENGINEERING

(Applicable for the students admitted in the Academic year 2021-2022 onwards)

#### FOUR YEAR FULL TIME

#### CURRICULUM AND SYLLABUS (2021)













#### I – VIII SEMESTERS

APPROVAL	
BOS	ACM
19.08.2021	30.09.2021

<b>VISION</b>	To be a University of global dynamism with excellence in knowledge and innovation ensuring social responsibility for creating an egalitarian society.
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<b>MISSION</b>	<b>IM1</b>	Offering well balanced programmes with scholarly faculty and state-of-art facilities to impart high level of knowledge.
	<b>IM2</b>	Providing student - centered education and foster their growth in critical thinking, creativity, entrepreneurship, problem solving and collaborative work.
	<b>IM3</b>	Involving progressive and meaningful research with concern for sustainable development.
	<b>IM4</b>	Enabling the students to acquire the skills for global competencies.
	<b>IM5</b>	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.

## DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

<b>VISION</b>	To be a leader in imparting advanced technical knowledge and skills in the field of Computer Science and Engineering with societal consciousness.
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<b>MISSION</b>	<b>DM1</b>	To offer programmes with state of art facilities in the field of Computer Science and Engineering.
	<b>DM2</b>	To prepare the students to become globally competent by enhancing their skills to work in IT Industries and R & D organizations.
	<b>DM3</b>	To prepare the students to have universal values and an ability to relate engineering issues with environmental consciousness to broader social context.
	<b>DM4</b>	To promote significant research in cutting edge computing technologies.

**Table: 1 Mapping of Institute Mission (IM) and Department Mission (DM)**

	<b>IM1</b>	<b>IM2</b>	<b>IM3</b>	<b>IM4</b>	<b>IM5</b>
<b>DM1</b>	3	3	3	1	1
<b>DM2</b>	2	2	2	3	2
<b>DM3</b>	2	2	1	2	3
<b>DM4</b>	1	1	2	2	2

**1-Low      2- Medium      3 – High**

### PROGRAMME EDUCATIONAL OBJECTIVES

PEO1	Graduates will be successful engineers in their career.
PEO2	Graduates will demonstrate diversified technical, professional and entrepreneurial skills in Computer Science and Engineering and allied discipline.
PEO3	Graduates will communicate, plan, coordinate, organize, make decisions and lead the team effectively.
PEO4	Graduates will be a lifelong learner and exhibit ethical and social responsibility.

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

<b>PEO / DM</b>	<b>DM1</b>	<b>DM 2</b>	<b>DM 3</b>	<b>DM4</b>
<b>PEO 1</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>PEO 2</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>
<b>PEO 3</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>
<b>PEO 4</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>3</b>

*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 program.
2. **Problem Analysis:** 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 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 teamwork:** Perform as an individual and as a leader in diverse teams and in multi-disciplinary scenarios.
10. **Communication Skills:** Professional communication with society to comprehend and formulate reports, documentation, effective delivery of presentation and responsible to clear instructions.
11. **Project 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 (POs) & PROGRAM SPECIFIC OUTCOME (PSOs)

PROGRAM OUTCOMES	
PO 1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO 3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety
PO 4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO 9	<b>Individual and teamwork:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	<b>Life-long learning:</b> Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PROGRAM SPECIFIC OUTCOMES	
PSO1	Ability to understand and analyze the computer engineering principles and to acquire competency in design and development in the emerging areas including Internet of Things, Data Science, Computer Vision, Computer Networks and Security.

<b>PSO2</b>	Ability to evolve as an ethical computer engineer with up-to-date technical skills to solve societal and environmental problems in an innovative way.
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**Table 3 Mapping of Program Outcomes (POs) with Program Educational Objectives (PEOs)**

<b>PEO / PO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>PEO 1</b>	3	3	3	3	3	2	1	1	1	1	1	1	3	2
<b>PEO 2</b>	3	3	3	3	3	2	2	1	1	2	2	1	3	2
<b>PEO 3</b>	1	1	1	1	-	1	-	1	2	2	2	2	1	1
<b>PEO 4</b>	1	1	1	1	1	2	2	2	2	1	2	1	-	1

**0-No Relation    1- Low Relation    2 – Medium Relation    3-High Relation**

## CURRICULUM AND SYLLABUS

### SEMESTER I

S.No.	Description	AICTE Abbr.	Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1	MA-I	BSC	XMA101	Calculus and Linear Algebra	3	1	0	4	3	1	0	4
2	BE	ESC	XBE102	Electrical and Electronics Engineering Systems	3	1	0	4	3	1	0	4
3	C	BSC	XAC103	Applied Chemistry for Engineers	3	1	0	4	3	1	0	4
4	PPS-T	ESC	XCS104	Basics of Electronic Devices and Circuits.	3	0	0	3	3	0	0	3
5	SC	HSMC	XGS105	Speech Communication	0	1	2	3	0	1	4	5
6	UMAN-I	MC	XUM106	Constitution of India	0	0	0	0	3	0	0	3
7	BEL	ESC	XBE107	Electrical and Electronics Engineering Systems Laboratory	0	0	1	1	0	0	2	2
8	CL	BSC	XAC108	Applied Chemistry for Engineers Laboratory	0	0	1	1	0	0	2	2
				<b>Total</b>				<b>20</b>				<b>27</b>

**Total Credits – 20    Total Hours- 27**

### SEMESTER II

S.No.	Description	AICTE Abbr.	Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1.	MA-II	BSC	XMA201	Calculus, Ordinary Differential Equations and Complex Variable	3	1	0	4	3	1	0	4
2.	PPS-T	ESC	XCP202	Programming for Problem Solving	3	0	0	3	3	0	0	3
3	P	BSC	XAP203	Applied Physics for Engineers	3	1	0	4	3	1	0	4
4	TC	HSMC	XGS204	Technical Communication	2	0	0	2	2	0	0	2
5	Works	ESC	XWP205	Workshop Practices	1	0	2	3	1	0	4	5
6	EM/BT	ESC	XEM206	Engineering Mechanics	3	0	0	3	3	0	0	3
7	PPS-L	ESC	XCP207	Programming for Problem Solving Laboratory	0	0	1	1	0	0	2	2
8	PL	BSC	XAP208	Applied Physics for Engineers Laboratory	0	0	1	1	0	0	2	2
				<b>Total</b>				<b>21</b>				<b>25</b>

**Total Credits – 21    Total Hours- 25**

### SEMESTER III

S.No.	Description	AICTE Abbr.	Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1.	MA-III	BSC	XPS301	Probability and Statistics	3	0	0	3	3	0	0	3
2.	PCC T	PCC	XCS302	Digital Electronics	3	1	0	4	3	1	0	4
3.	PCC-T	PCC	XCS303	Data Structure & Algorithms	3	0	0	3	3	0	0	3
4.	PCC-T	PCC	XCS304	Object Oriented Programming	3	0	0	3	3	0	0	3
5.	PCC-T	PCC	XCS305	Signals & Systems	3	1	0	4	3	1	0	4
6.	MNGT-I	HSMC	XUM306	Entrepreneurship Development	2	0	0	2	2	0	0	2
7.	UMAN-I	MC (HSMC)	XUM307	Universal Human Values 2: Understanding Harmony and Gender	2	1	0	3	2	1	0	3
8	PCC-L	PCC	XCS308	Data Structure & Algorithms Laboratory	0	0	1	1	0	0	2	2
9	PCC-L	PCC	XCS309	Object Oriented Programming Laboratory	0	0	1	1	0	0	2	2
10	IPT-I	PROJ	XCS310	In-plant Training - I	-	-	-	1	-	-	-	-
				<b>Total</b>				<b>25</b>				<b>26</b>

**Total Credits - 25 Total Hours - 26**

### SEMESTER IV

S.No.	Description		Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1.	MA-IV	BSC	XCS401	Discrete Mathematics	3	0	0	3	3	0	0	3
2.	PCC T	PCC	XCS402	Computer Organization & Architecture	3	1	0	4	3	1	0	4
3.	PCC-T	PCC	XCS403	Operating Systems	3	0	0	3	3	0	0	3
4.	PCC-T	PCC	XCS404	Design & Analysis of Algorithms	3	0	0	3	3	0	0	3
5.	MNGT-II	HSMC	XUM009	Economics for Engineers	3	0	0	3	3	0	0	3
6	UMAN-III	MC	XUM003	Disaster Management	0	0	0	0	3	0	0	3
7	PCC-L	PCC	XCS407	IT Workshop Laboratory	0	0	1	1	0	0	2	2
8	PCC-L	PCC	XCS408	Operating Systems Laboratory	0	0	1	1	0	0	2	2
9	PCC-L	PCC	XCS409	Design and Analysis of Algorithms Laboratory	0	0	1	1	0	0	2	2
				<b>Total</b>				<b>19</b>				<b>25</b>

**Total Credits – 19 Total Hours- 25**

### SEMESTER V

S.No.	Description		Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1	PCC T	PCC	XCS501	Formal Language and Automata Theory	3	0	0	3	3	0	0	3
2	PCC-T	PCC	XCS502	Database Management Systems	3	0	0	3	3	0	0	3
3	PCC-T	PCC	XCS503	Software Engineering	3	0	0	3	3	0	0	3
4	PCC-T	PCC	XCS504	Computer Networks	3	1	0	4	3	1	0	4
5	PEC-I	PEC	XCSE**	Professional Elective Course	3	0	0	3	3	0	0	3
6	OE I	OE	XOE**	Open Elective Course	3	0	0	3	3	0	0	3
7	PCC-L	PCC	XCS507	Database Management Systems Laboratory	0	0	1	1	0	0	2	2
8	PCC-L	PCC	XCS508	Software Engineering Laboratory	0	0	1	1	0	0	2	2
9	IPT-II	PROJ	XCS509	In-Plant Training – II	-	-	-	1	-	-	-	-
				<b>Total</b>				<b>22</b>				<b>23</b>

**Total Credits -22 Total Hours -23**

### SEMESTER VI

S.No.	Description	AICTE Abbr.	Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1	PCC T	PCC	XCS601	Compiler Design	3	0	0	3	3	0	0	3
2	PCC-T	PCC	XCS602	Big Data Analytics	3	0	0	3	3	0	0	3
3	PEC-II	PEC	XCSE**	Professional Elective courses	3	0	0	3	3	0	0	3
4	OE II	OE	XOE**	Open Elective Course	3	0	0	3	3	0	0	3
5	ELS	HSMC	XGS605	Professional Skills	1	0	2	3	1	0	4	5
6	UMAN-IV/ PCC-T	PCC	XCS606	Cyber Security	3	0	0	3	3	0	0	3
9	PCC-L	PCC	XCS607	Compiler Design Laboratory	0	0	1	1	0	0	2	2
10	PCC-L	PCC	XCS608	Big Data Analytics Laboratory	0	0	1	1	0	0	2	2
				<b>Total</b>				<b>20</b>				<b>24</b>

**Total Credits – 20 Total Hours- 24**

### SEMESTER VII

S.No.	Description	AICTE Abbr.	Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1	PCC T	PCC	XCS701	Web Technology	3	0	0	3	3	0	0	3
2	PCC-T	PCC	XCS702	Machine Learning	3	0	0	3	3	0	0	3
3	PEC-III	PEC	XCSE**	Professional Elective courses	3	0	0	3	3	0	0	3
4	OE III	OE	XOE**	Open Elective Courses	3	0	0	3	3	0	0	3
5	UMAN-V	MC	XUM008	Environmental science	0	0	0	0	3	0	0	3
6	PCC-L	PCC	XCS706	Web Technology Laboratory	0	0	1	1	0	0	2	2
7	PCC-L	PCC	XCS707	Machine Learning Laboratory	0	0	1	1	0	0	2	2
8	Proj I	PROJ	XCS708	Project Work (Phase-I)	0	0	2	2	0	0	4	4
9	IPT III	PROJ	XCS709	In-plant Training - III	-	-	-	2	-	-	-	-
				<b>Total</b>				<b>18</b>				<b>23</b>

**Total Credits – 18    Total Hours- 23**

### SEMESTER VIII

S.No.	Description	AICTE Abbr.	Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1	PEC-IV	PEC	XCSE**	Professional Elective courses	3	0	0	3	3	0	0	3
2	OE IV	OE	XOE**	Open Elective Courses	3	0	0	3	3	0	0	3
3	OE V	OE	XOE**	Open Elective Courses	3	0	0	3	3	0	0	3
4	Proj II	PROJ	XCS804	Project Work (Phase-II)	0	0	9	9	0	0	18	18
				<b>Total</b>				<b>18</b>				<b>27</b>

**Total Credits -18    Total Hours-27**

**\*\* Professional Elective**

**\* Open Elective**

**\*# Non-credit Course**

<b>Grant Total Credits: 163</b>
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## LIST OF ELECTIVES

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

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

### Semester V

S.No.	Description	AICTE Abbr.	Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1	PEC-I	PEC	XCSE51	Graph Theory	3	0	0	3	3	0	0	3
2	PEC-I	PEC	XCSE52	Real Time Systems	3	0	0	3	3	0	0	3
3	PEC-I	PEC	XCSE53	Soft Computing	3	0	0	3	3	0	0	3
4	PEC-I	PEC	XCSE54	Human Computer Interaction	3	0	0	3	3	0	0	3

### Semester VI

S.No.	Description	AICTE Abbr.	Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1	PEC-II	PEC	XCSE61	Information Theory and Coding	3	0	0	3	3	0	0	3
2	PEC-II	PEC	XCSE62	Distributed Systems	3	0	0	3	3	0	0	3
3	PEC-II	PEC	XCSE63	Data Mining	3	0	0	3	3	0	0	3
4	PEC-II	PEC	XCSE64	Cloud Computing	3	0	0	3	3	0	0	3
5	PEC-II	PEC	XCSE65	Mobile Communication	3	0	0	3	3	0	0	3

### Semester VII

S.No.	Description	AICTE Abbr.	Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1	PEC-III	PEC	XCSE71	Parallel Algorithms	3	0	0	3	3	0	0	3
2	PEC-III	PEC	XCSE72	Internet of Things	3	0	0	3	3	0	0	3
3	PEC-III	PEC	XCSE73	Artificial Intelligence	3	0	0	3	3	0	0	3
4	PEC-III	PEC	XCSE74	Image Processing	3	0	0	3	3	0	0	3
5	PEC-III	PEC	XCSE75	Mobile Application Development	3	0	0	3	3	0	0	3

## Semester VIII

S.No.	Description	AICTE Abbr.	Course Code	Courses	Credits				Hours			
					L	T	P	Total	L	T	P	Total
1	PEC-IV	PEC	XCSE81	Queuing Theory and Modeling	3	0	0	3	3	0	0	3
2	PEC-IV	PEC	XCSE82	Ad-Hoc and Sensor Networks	3	0	0	3	3	0	0	3
3	PEC-IV	PEC	XCSE83	Information Retrieval	3	0	0	3	3	0	0	3
4	PEC-IV	PEC	XCSE84	Cryptography and Network Security	3	0	0	3	3	0	0	3
5	PEC-IV	PEC	XCSE85	Project Management	3	0	0	3	3	0	0	3

## Open Electives

S.No.	Course Code	Courses	Credits				Hours			
			L	T	P	Total	L	T	P	Total
1	XCSOE1	Web Design I	3	0	0	3	3	0	0	3
2	XCSOE2	Web Design II	3	0	0	3	3	0	0	3
3	XCSOE3	Multimedia Design and Development	3	0	0	3	3	0	0	3
4	XCSOE4	Computer Installation and Troubleshooting	3	0	0	3	3	0	0	3

## SEMESTER I

<b>COURSE CODE</b>			<b>XMA101</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>			<b>Mathematics I (Calculus and Linear Algebra)</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>3</b>	<b>0.5</b>	<b>0.5</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>PREREQUISITE:</b> Differentiation and Integration							
<b>Course outcomes:</b>				<b>Domain</b>		<b>Level</b>	
<b>CO1</b>	<b>Apply</b> orthogonal transformation to reduce quadratic form to canonical forms.			Cognitive		Apply	
<b>CO2</b>	<b>Apply</b> power series to tests the convergence of the Sequences and series. Half range Fourier sine and cosine series.			Cognitive		Apply	
<b>CO3</b>	<b>Find</b> the derivative of composite functions and Implicit functions. Euler's theorem and Jacobian			Cognitive		Remember	
<b>CO4</b>	<b>Explain</b> 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		Understand	
<b>CO5</b>	<b>Apply</b> Differential and Integral calculus to notions of Curvature and to improper integrals.			Cognitive		Apply	

<b>Unit 1: Matrices</b>	<b>9+3</b>
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).	
<b>Unit 2: Sequences and series</b>	<b>9+3</b>
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.	
<b>Unit 3: Multivariable Calculus: Partial Differentiation</b>	<b>9+3</b>
Limits and continuity –Partial differentiation – Total Derivative – Partial differentiation of Composite Functions: Change of Variables – Differentiation of an Implicit Function - Euler's Theorem- Jacobian.	
<b>Unit 4: Multivariable Calculus: Maxima and Minima and Vector Calculus</b>	<b>9+3</b>
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.	
<b>Unit 5: Differential and Integral Calculus</b>	<b>9+3</b>
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
<b>TEXT BOOKS</b>			
1. Ramana B.V., “Higher Engineering Mathematics”, Tata McGraw Hill New Delhi, 11th Reprint, 2015. <b>(Unit-1, Unit-3 and Unit-4).</b> 2. N.P. Bali and Manish Goyal, “A text book of Engineering Mathematics”, Laxmi Publications, Reprint, 2014. <b>(Unit-2).</b> 3. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 40 <sup>th</sup> Edition, 2010. <b>(Unit-5).</b>			
<b>REFERENCES</b>			
1. G.B. Thomas and R.L. Finney, “Calculus and Analytic geometry”, 9 <sup>th</sup> 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”, 2 <sup>nd</sup> Edition, Brooks/Cole, 2005. 4. Erwin kreyszig, “Advanced Engineering Mathematics”, 9 <sup>th</sup> Edition, John Wiley & Sons, 2006.			

#### Mapping of COs with GAs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO 1</b>	3	2	0	0	2	0	0	0	0	1	0	2
<b>CO 2</b>	3	1	0	0	0	0	0	0	0	1	0	1
<b>CO 3</b>	3	1	0	0	0	0	0	0	0	1	0	1
<b>CO 4</b>	3	2	0	0	0	0	0	0	0	1	0	1
<b>CO 5</b>	3	2	0	0	1	0	0	0	0	1	0	2
<b>Total</b>	15	8	0	0	3	0	0	0	0	5	0	7
<b>Scaled Value</b>	3	2	0	0	1	0	0	0	0	1	0	2

1 – 5 → 1,                      6 – 10 → 2,                      11 – 15 → 3  
0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

<b>COURSE CODE</b>	<b>XBE102</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>ELECTRICAL AND ELECTRONICS ENGINEERING SYSTEMS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>PREREQUISITES</b>	<b>Physics</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C: P: A</b>	<b>3:0:0</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Course Outcomes</b>		<b>Domain</b>		<b>Level</b>	
<b>CO1</b>	<b>Define and Relate</b> the fundamentals of electrical parameters and <b>build and explain</b> AC, DC circuits by Using measuring devices	Cognitive		Understand	
<b>CO2</b>	<b>Define and Explain</b> the operation of DC and AC machines.	Cognitive		Understand	
<b>CO3</b>	<b>Recall and Illustrate</b> various semiconductor devices and their applications and displays the input output characteristics of basic semiconductor devices.	Cognitive		Understand	
<b>CO4</b>	<b>Relate and Explain the</b> number systems and logic gates. <b>Construct</b> the different digital circuit.	Cognitive		Understand	
<b>CO5</b>	<b>Label and Outline the</b> different types of microprocessors and their applications.	Cognitive		Understand	

<b>UNIT-I: FUNDAMENTALS OF DC AND AC CIRCUITS, MEASUREMENTS</b>	<b>9+3</b>
Fundamentals of DC– Ohm’s Law – Kirchhoff’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).	
<b>UNIT -II: ELECTRICAL MACHINES</b>	<b>9 + 3</b>
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.	

<b>UNIT- III: SEMICONDUCTOR DEVICES</b>	<b>9 + 3</b>
Classification of Semiconductors, Construction, Operation and Characteristics: PN Junction Diode – Zener Diode, PNP, NPN Transistors, Field Effect Transistors and Silicon Controlled Rectifier – Applications.	
<b>UNIT- IV: DIGITAL ELECTRONICS</b>	<b>9 + 3</b>
Basic of Concepts of Number Systems, Logic Gates, Boolean Algebra, Adders, Subtractors, multiplexer, demultiplexer, encoder, decoder, Flipflops, Up/Down counters, Shift Registers.	
<b>UNIT- V: MICROPROCESSORS</b>	<b>9+ 3</b>
Architecture, 8085, pin diagram of 8085, ALU timing and control unit, registers, data and address bus, timing and control signals, Instruction types, classification of instructions, addressing modes, Interfacing Basics: Data transfer concepts – Simple Programming concepts.	
<b>LECTURE</b>	<b>TUTORIAL TOTAL</b>
<b>45</b>	<b>15 60</b>

**TEXT BOOKS**

1. Metha V.K, Rohit Mehta, 2020. Principles of Electronics, 12<sup>th</sup> ed, S Chand Publishing.
2. Albert Malvino, David J. Bates., 2017. Electronics Principles. 7th ed, Tata McGraw-Hill. New Delhi.
3. Rajakamal, 2014. Digital System-Principle & Design. 2nd ed. Pearson education.
4. Morris Mano, 2015. Digital Design. Prentice Hall of India.
5. Ramesh, S. Gaonkar, 2013, Microprocessor Architecture, Programming and its Applications with the 8085, 6<sup>th</sup> 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. and Halkias, 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. NPTEL, 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://freevidelectures.com/Course/2335/Basic-Electrical-Technology#>, IISc Bangalore.
3. <http://nptel.ac.in/Onlinecourses/Nagendra/>, Dr. Nagendra Krishnapura, IIT Madras.
4. Dr. L. Umanand, <http://www.nptelvideos.in/2012/11/basic-electrical-technology.html>, IISc Bangalore.

**Mapping of COs with GAs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	3	1	1	1	1	0	0	1	1	1	0
CO 2	3	3	1	1	1	1	0	0	1	1	1	0
CO 3	2	2	2	1	2	2	1	1	1	1	1	0
CO 4	2	2	1	1	1	1	1	1	1	1	1	0
CO 5	2	2	1	1	1	1	1	1	1	1	1	0
<b>Total</b>	<b>12</b>	<b>12</b>	<b>6</b>	<b>5</b>	<b>6</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>0</b>
<b>Scaled</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>

<b>COURSE CODE</b>		<b>XAC103</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>		<b>APPLIED CHEMISTRY FOR ENGINEERS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>PREREQUISITES</b>		<b>NIL</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>		<b>2.5:1:0.5</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>COURSE OBJECTIVES</b>						
<ul style="list-style-type: none"><li>Understand the application of chemistry in engineering.</li></ul>						
<b>COURSE OUTCOMES</b>			<b>DOMAIN</b>		<b>LEVEL</b>	
<b>CO1</b>	<i>Identify</i> the periodic properties and <i>demonstrate</i> the various water quality parameters like hardness and alkalinity.		Cognitive		Remember	
<b>CO2</b>	<i>Interpret</i> the bulk properties and processes using thermodynamic, kinetic and electrochemical aspects.		Cognitive		Understand	
<b>CO3</b>	<i>Illustrate</i> the wave mechanical properties of electrons in atomic models and <i>Identify</i> the possible orbital energy levels in atoms, molecules and intermolecular forces.		Cognitive		Apply	
<b>CO4</b>	<i>Explain</i> the theory, instrumentation, interpretation and applications of Electronic, Vibrational, Rotational and NMR spectroscopy techniques		Cognitive		Analyse	
<b>CO5</b>	<i>Apply</i> the stereochemistry concept in a proper perspective and Predict the various types of fundamental reaction mechanisms involved in organic reactions.		Cognitive		Apply	
<b>UNIT I</b>		<b>PERIODIC PROPERTIES AND WATER CHEMISTRY</b>			<b>8L+3T</b>	
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 and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries. <b>Water Chemistry</b> -Water quality parameters-Definition and explanation of hardness, determination of hardness by EDTA method-Introduction to alkalinity.						
<b>UNIT II</b>		<b>USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA</b>			<b>12L+3T</b>	
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).						
<b>UNIT III</b>		<b>ATOMIC AND MOLECULAR STRUCTURE</b>			<b>10L+3T</b>	
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. <i>Intermolecular forces and potential energy surfaces</i> Ionic, dipolar and Vander waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H <sub>3</sub> , H <sub>2</sub> F and HCN and trajectories on these surfaces.						
<b>UNIT IV</b>		<b>SPECTROSCOPIC TECHNIQUES AND APPLICATIONS</b>			<b>7L+3T</b>	
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		8L+3T
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 <i>Organic reactions and synthesis of a drug molecule</i> 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:45	TUTORIAL:15	PRACTICAL:0	TOTAL:60
TEXT BOOKS			
1.	Puri B.R. Sharma, L.R., Kalia K.K. Principles of Inorganic Chemistry, (23 <sup>rd</sup> edition), New Delhi, ShobanLalNagin 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, 10 <sup>th</sup> 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, (3 <sup>th</sup> Edition), McGraw-Hill Book Company, Europe 1983.		
7.	Bahl B.S. and ArunBahl, Advanced Organic Chemistry, (4 <sup>th</sup> edition), S./ Chand & Company Ltd. New Delhi, 1977.		
8.	P. S. Kalsi, Stereochemistry: Conformation and mechanism, (9 <sup>th</sup> Edition), New Age International Publishers, 2017.		
REFERENCES			
1.	Puri B R Sharma L R and Madan S Pathania, "Principles of Physical Chemistry", Vishalpublishing Co., Edition 2004.		
2.	Kuriocose, J C and Rajaram, J, "Engineering Chemistry", Volume I/II, Tata McGraw-Hill Publishing Co. Ltd. New Delhi, 2000.		

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

### Mapping of COs with GAs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO 1</b>	2	2	2	2	1	2	1	1	1	0	1	1
<b>CO 2</b>	2	2	0	1	1	0	0	0	0	0	0	1
<b>CO 3</b>	2	2	2	1	1	2	0	0	0	0	0	1
<b>CO 4</b>	2	2	1	2	1	2	1	1	1	0	1	1
<b>CO 5</b>	2	2	1	3	1	2	0	0	0	0	1	1
<b>Total</b>	<b>10</b>	<b>10</b>	<b>6</b>	<b>9</b>	<b>5</b>	<b>8</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>5</b>
<b>Scaled Value</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>

COURSE CODE			XCS104		L	T	P	C	
COURSE NAME			BASIC ELECTRONIC DEVICES AND CIRCUITS		3	0	0	3	
PREREQUISITES			PHYSICS AND MATHEMATICS		L	T	P	H	
C	P	A			3	0	0	3	
3	0	0							
LEARNING OBJECTIVES									
<ul style="list-style-type: none"><li>To introduce the operation of different types of semiconductor devices.</li><li>To familiarize the integrated circuits technology.</li><li>To provide knowledge on the characteristics of up to electronic devices</li></ul>									
COURSE OUTCOMES:					Domain		Level		
CO1	Define the principles of semiconductor physics.				Cognitive		Remember		
CO2	Describe the operation and characteristics of semiconductor diodes.				Cognitive		Understand		
CO3	Understand the operation and Characteristics of BJT and FET				Cognitive		Understand		
CO4	Discuss the operation and characteristics of power electronic and optoelectronic diodes				Cognitive		Understand		
CO5	Illustrate the Integrated Circuit fabrication processes.				Cognitive		Understand		
UNIT - I Introduction To Semiconductor Technology								9	
Review of Quantum Mechanics, Electrons in periodic Lattices, E- k diagrams. Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance, design of resistors.									
UNIT - II Junction Diodes And Applications								9	
Generation and recombination of carriers; Poisson and continuity equation P-N junction characteristics, I-V characteristics, and small signal switching models; Avalanche breakdown, Zenerdiode , Half wave Rectifier, Full wave Rectifier, Bridge Rectifier and Voltage Regulators.									
UNIT - III Transistors And Applications								9	
Bipolar Junction Transistor, I-V characteristics, NPN and PNP Transistors , Ebers-Moll Model, MOS capacitor, C-V characteristics, Junction Field Transistor, VI Characteristics, MOSFET,I-V characteristics, and small signal models of MOS transistor.									
UNIT - IV Special Electronic Devices								9	
SCR, DIAC, TRIAC , LED, LDR,LCD, Photodiode, Photo Transistor and solar cell.									
UNIT - V Introduction To Integrated Circuit Technology								9	
Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process.									
HOURS			LECTURE		TUTORIAL		PRACTICAL		TOTAL
			45				0		45

**TEXT BOOKS**

1. Robert L. Boylestad and Louis Nashelsky , “Electronics devices and Circuit Theory” 11<sup>th</sup> Edition, UBS Publishers, New Delhi, 2013.
2. G.Streetman, and S.K.Banerjee, “Solid State Electronic Devices,” 7<sup>th</sup> edition, Pearson, 2014.
3. D.Neamen, D.Biswas "Semiconductor Physics and Devices," McGraw-Hill Education Jacob
4. Millman and Christos C.Halkias, “Electronic Devices and Circuits” 3<sup>rd</sup> Edition, Tata McGraw Hill, New Delhi, 2010.

**REFERENCES**

1. C.T.Sah, “Fundamentals of solid state electronics,” World Scientific publishing Co.Inc, 1991.
2. S.M.Sze and K.N.Kwok, “Physics of Semiconductor Devices,” 3<sup>rd</sup> edition, John Wiley & Sons, 2006.
3. Y.Tsividis and M.Colin, “Operation and Modeling of the MOS Transistor,” Oxford University Press, 2011.
4. David A. Bell ,”Electronic devices and circuits”, Prentice Hall of India, 2004.
5. S.Salivahanan, “Electronics devices and circuits”. 2<sup>nd</sup> Edition, Tata McGraw Hill, 2008.

**E-REFERENCES**

1. <https://www.digimat.in/nptel/courses/video/108101091/L01.html>
2. <http://nptel.ac.in/courses/117103063/> (Prof. Chitrlekha Mahanta, NPTEL, Basic Electronics, IIT-Guwahati)
3. <http://nptel.ac.in/video.php?subjectId=117103063> (Prof. Gautam Barua, NPTEL, Basic Electronics, IIT-Guwahati)
4. <http://nptel.ac.in/courses/117101106/> (Prof. A N chandorkar, NPTEL, Analog Electronics, IIT-Bombay)
5. <https://www.digimat.in/nptel/courses/video/108108112/L01.html>

**Mapping of COs with POs:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO 1</b>	1	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>CO 2</b>	1	2	0	0	0	0	0	0	0	0	0	0	0	0
<b>CO 3</b>	2	1	2	0	0	0	0	0	0	0	0	0	0	0
<b>CO 4</b>	1	1	2	0	0	0	0	0	0	0	0	0	0	0
<b>CO 5</b>	0	0	3	0	1	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>5</b>	<b>4</b>	<b>7</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Scaled value</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

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

<b>COURSE CODE</b>		<b>XGS105</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>COURSE NAME</b>		<b>SPEECH COMMUNICATION</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>3</b>
<b>PRE-REQUISITES</b>		<b>--</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>C: P: A</b>		<b>2.6:0.4:0</b>	<b>0</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>5</b>
<b>COURSE OUTCOMES:</b>			<b>Domain</b>		<b>Level</b>		
CO1	<i>Ability</i> to recall the types of speeches		Cognitive		Remember		
CO2	<i>Apply</i> the techniques in public speaking		Cognitive		Apply		
CO3	<i>Identify</i> the common patterns in organizing a speech		Cognitive		Remember		
CO4	<i>Construct</i> the nature and style of speaking		Cognitive		Create		
CO5	<i>Practicing</i> the speaking skills		Psychomotor		Guided Response		
<b>UNIT I – Types of Speeches</b>							<b>9</b>
1.1 – Four types of speeches							
1.2 – Analyzing the audience							
1.3 - Developing ideas and supporting materials							
<b>UNIT II – Public Speaking</b>							<b>9</b>
2.1 - Introduction to Public Speaking							
2.2 - Competencies Needed for successful speech making							
2.3 – Speaking about everyday life situations							
<b>UNIT III – Organization of Speech</b>							<b>9</b>
3.1 – Developing a speech out line							
3.2 - Organizing the speech							
3.3 – Introduction - development – conclusion							
<b>UNIT IV – Presentation</b>							<b>9</b>
4.1 - Tips for preparing the draft speech							
4.2 – Presentation techniques using ICT tools							
4.3 – Using examples from different sources							
<b>UNIT V – Activities</b>							<b>9</b>
5.1 – Reading activities							
5.2 – Creative presentations							
5.3 – Media presentation techniques							
<b>Suggested Readings:</b>							
(i) Michael Swan. <i>Practical English Usage</i> . OUP. 2010							
(ii) Sanjay Kumar and Pushp Lata. <i>Communication Skills</i> . Oxford University Press. 2011							

#### **Mapping of COs with GAs:**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	2	0	0	0	1	0	0	1	1	3	0	3
<b>CO2</b>	0	0	0	0	1	0	0	1	1	3	0	3
<b>CO3</b>	2	0	0	0	1	0	0	1	1	3	0	3
<b>CO4</b>	3	0	0	0	1	0	0	1	3	3	1	3
<b>CO5</b>	3	0	0	0	1	0	0	1	1	2	1	3
<b>Total</b>	10	0	0	0	5	0	0	5	7	14	2	15
<b>Scaled value</b>	3	0	0	0	1	0	0	1	2	3	1	3

1-5= 1, 6-10 = 2, 11-15= 3

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

<b>COURSE CODE</b>		<b>XUM106</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>		<b>CONSTITUTION OF INDIA</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>PREREQUISITE:</b>		<b>--</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>		<b>0:0:0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>COURSE OUTCOMES</b>			<b>Domain</b>		<b>Level</b>	
CO1	<i>Understand</i> the Constitutional History		Cognitive		Understand	
CO2	<i>Understand</i> the Powers and Functions		Cognitive		Understand	
CO3	<i>Understand</i> the Legislature		Affective		Remember	
CO4	<i>Understand</i> the Judiciary		Affective		Remember	
CO5	<i>Understand</i> the Centre State relations		Cognitive		Understand	
<b>UNIT - I</b>						<b>8</b>
Constitutional History- The Constitutional Rights- Preamble- Fundamental Rights- Fundamental Duties- Directive principles of State Policy.						
<b>UNIT - II</b>						<b>9</b>
The Union Executive- The President of India (powers and functions)- Vice-President of India-The Council of Ministers-Prime Minister- Powers and Functions.						
<b>UNIT - III</b>						<b>10</b>
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.						
<b>UNIT - IV</b>						<b>9</b>
The Union Judiciary- Powers of the Supreme Court- Original Jurisdiction- Appelete jurisdictions- Advisory Jurisdiction- Judicial review.						
<b>UNIT - V</b>						<b>9</b>
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.						
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>		<b>TOTAL</b>	
	<b>45</b>	<b>0</b>	<b>0</b>		<b>45</b>	
<b>REFERENCES</b>						
1. W.H.Morris Shores- Government and politics of India, NewDelhi,B.I.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.						

### Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO 1</b>	0	0	0	0	0	1	1	1	0	0	0	0
<b>CO 2</b>	0	0	0	0	0	0	0	0	0	0	0	0
<b>CO 3</b>	0	0	0	0	0	0	0	0	0	0	0	0
<b>CO 4</b>	0	0	0	0	0	0	0	0	0	0	0	0
<b>CO 5</b>	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Scaled Value</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

1-5 →1, 6-10 →2, 11-15 →3

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

<b>COURSE CODE</b>	<b>XBE107</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>ELECTRICAL AND ELECTRONICS ENGINEERING SYSTEMS LABORATORY</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>PREREQUISITE</b>	<b>Physics</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C : P : A</b>	<b>0.3 : 0.3 : 0.3</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>

#### **COURSE OBJECTIVES:**

The course helps to

- Learn the basic concepts of electrical and electronics components.
- Understand the basic wiring methods and connection.
- Study the characteristics of diodes, Zener diodes, NPN transistors.
- Verify the working of simple logic gates, adders and subtractors.

<b>Course Outcomes:</b>		<b>Domain</b>	<b>Level</b>
<b>CO1</b>	<b>Apply</b> the fundamental electrical concepts and <b>differentiate</b> the various electronic components.	Cognitive Psychomotor Affective	Understand Set Value
<b>CO2</b>	<b>Implement</b> and <b>execute</b> the different types of wiring connections.	Cognitive Psychomotor Affective	Understand Set Value
<b>CO3</b>	<b>Demonstrate</b> the Fluorescent lamp connection with choke.	Cognitive Psychomotor Affective	Understand Set Value
<b>CO4</b>	<b>Characterize</b> and <b>display</b> the basic knowledge on the working of PN junction and Zener diode.	Cognitive Psychomotor Affective	Understand Set Value
<b>CO5</b>	<b>Implement</b> and <b>execute</b> the various digital electronic circuits such as Adders and Subtractors.	Cognitive Psychomotor Affective	Understand Set Value

#### **List of Experiments:**

- Study of Electrical Symbols, Tools and Safety Precautions, Power Supplies.
- Study of Active and Passive elements – Resistors, Inductors and Capacitors, Bread Board.
- Testing of DC Voltage and Current in series and parallel resistors which are connected in breadboard by using Voltmeter, Ammeter and Multimeter.
- Fluorescent lamp connection with choke.
- Staircase Wiring
- Forward and Reverse bias characteristics of PN junction diode.
- Forward and Reverse bias characteristics of zener diode.
- Input and Output Characteristics of NPN transistor.
- Construction and verification of simple logic gates.
- Construction and verification of adders and subtractors.

	<b>PRACTICAL</b>	<b>TOTAL</b>
	<b>30</b>	<b>30</b>

### Mapping of COs with GAs

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO 1</b>	3	3	1	1	1	1	0	0	1	1	1	0
<b>CO 2</b>	3	3	1	1	1	1	0	0	1	1	1	0
<b>CO 3</b>	2	2	2	1	2	2	1	1	1	1	1	0
<b>CO 4</b>	2	2	1	1	1	1	1	1	1	1	1	0
<b>CO 5</b>	2	2	1	1	1	1	1	1	1	1	1	0
<b>Total</b>	<b>12</b>	<b>12</b>	<b>6</b>	<b>5</b>	<b>6</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>5</b>	<b>5</b>	<b>0</b>
<b>Scaled Value</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>

1-5 → 1, 6-10 → 2, 11-15 → 3

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

<b>COURSE CODE</b>	<b>XAC108</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>APPLIED CHEMISTRY FOR ENGINEERS LABORATORY</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>C:P:A</b>	<b>0.4: 0.4:0.2</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>PREREQUISITE:</b>	<b>Basic Physics in HSC level</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>COURSE OUTCOMES</b>		<b>Domain</b>		<b>Level</b>	
CO1	Analyse quantitatively, the amount of hardness and chloride in the given solution by volumetric method	Cognitive Psychomotor		Remember Mechanism	
CO2	Estimate the amount of substances present in the given solution using colorimeter, potentiometer and conductivity meter.	Cognitive Psychomotor Affective		Analyze Mechanism Receive	
CO3	Determine the surface tension, viscosity of a given solution and rate constant of a chemical reaction and synthesize drugs/polymers.	Cognitive Psychomotor		Apply Mechanism	

<b>Ex. No.</b>	<b>Experiments</b>	<b>COs</b>
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 oil.	CO5
<b>LECTURE : 0      TUTORIAL: 0      PRACTICAL: 30</b>		<b>TOTAL:30</b>

#### TEXT BOOK

1. Laboratory Manual "Chemistry Lab", Department of Chemistry, PMIST, Thanjavur.

#### REFERENCES

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.

#### E-RESOURCES- MOOC's

1. <http://freevideolectures.com/Course/2380/Chemistry-Laboratory-Techniques>
2. <http://ocw.mit.edu/courses/chemistry/5-301-chemistry-laboratory-techniques>
3. <http://freevideolectures.com/Course/2941/Chemistry-1A-General-Chemistry-Fall-2011>

**Mapping of COs with GAs:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	3	3	3	2	3	3	0	1	1	1	0
<b>CO2</b>	2	2	2	2	1	2	2	1	1	1	1	1
<b>CO3</b>	2	2	2	2	1	2	2	0	1	1	0	0
<b>Total</b>	7	7	7	7	4	7	7	1	3	3	2	1
<b>Scaled value</b>	2	2	2	2	1	2	2	1	1	1	1	1

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

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

## SEMESTER II

<b>COURSE CODE</b>			<b>XMA201</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>			<b>Calculus, Ordinary Differential Equations and Complex Variable</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C</b>	<b>P</b>	<b>A</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>3</b>	<b>0.5</b>	<b>0.5</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>PREREQUISITE : Mathematics I (Calculus and Linear Algebra)</b>							
<b>On successful completion of this course, the students will be able to:</b>							
<b>Course outcomes:</b>				<b>Domain</b>	<b>Level</b>		
<b>CO1: Find</b> double and triple integrals and to find line, surface and volume of an integral by <b>Applying</b> Greens, Gauss divergence and Stokes theorem.				Cognitive	Apply		
<b>CO2: Solve</b> first order differential equations of different types which are solvable for p, y, x and Clairaut's type.				Cognitive	Apply		
<b>CO3: Solve</b> Second order ordinary differential equations with variable coefficients using various methods.				Cognitive	Apply		
<b>CO4: Use</b> CR equations to verify analytic functions and to find harmonic functions and harmonic conjugate. Conformal mapping of translation and rotation. Mobius transformation.				Cognitive	Apply		
<b>CO5: Apply</b> Cauchy residue theorem to evaluate contour integrals involving sine and cosine function and to state Cauchy integral formula, Liouville's theorem. Taylor's series, zeros of analytic functions, singularities, Laurent's series.				Cognitive	Apply		
<b>Unit 1: Multivariable Calculus (Integration)</b>							<b>9+3</b>
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.							
<b>Unit 2: First order ordinary differential equations</b>							<b>9+3</b>
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.							
<b>Unit 3: Ordinary differential equations of higher orders</b>							<b>9+3</b>
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.							
<b>Unit 4: Complex Variable – Differentiation</b>							<b>9+3</b>
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.							

<b>Unit 5: Complex Variable – Integration</b>			<b>9+3</b>
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.			
<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
<b>45</b>	<b>15</b>	<b>60</b>	
<b>Text Book:</b>			
1. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 40th <sup>th</sup> Edition, 2008.			
<b>Reference Books:</b>			
1.G.B. Thomas and R.L. Finney, “Calculus and Analytic geometry”, 9 <sup>th</sup> Edition, Pearson, Reprint, 2002.			
2. Erwin kreyszig, “Advanced Engineering Mathematics”, 9 <sup>th</sup> Edition, John Wiley & Sons, 2006.			
3.W. E. Boyce and R. C. DiPrima, “Elementary Differential Equations and Boundary Value Problems”, 9 <sup>th</sup> Edn. Wiley India, 2009.			
4. S. L. Ross, “Differential Equations”, 3 <sup>rd</sup> 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”, 7 <sup>th</sup> Ed., McGraw Hill, 2004.			
8. N.P. Bali and Manish Goyal, “A text book of Engineering Mathematics”, Laxmi Publications, Reprint, 2008.			

### Mapping of Cos with GAs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO 1</b>	3	2	0	0	2	0	0	0	0	1	0	2
<b>CO 2</b>	3	1	0	0	0	0	0	0	0	1	0	1
<b>CO 3</b>	3	1	0	0	0	0	0	0	0	1	0	1
<b>CO 4</b>	3	2	0	0	0	0	0	0	0	1	0	1
<b>CO 5</b>	3	2	0	0	1	0	0	0	0	1	0	2
<b>Total</b>	<b>15</b>	<b>8</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>7</b>
<b>Scaled Value</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>2</b>

1 – 5 → 1,                      6 – 10 → 2,                      11 – 15 → 3  
0 –No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

Course code			:	XCP202			L	T	P	C	
Course name			:	PROGRAMMING FOR PROBLEM SOLVING			3	0	0	3	
Prerequisite			:	Mathematics knowledge, Analytical and Logical skills.			L	T	P	H	
C	P	A						3	0	0	3
3	0	0									
Course Objectives											
<ul style="list-style-type: none"><li>• <b>Design</b> solutions to simple engineering problem by applying the basic programming principles of C language and basic mathematical knowledge.</li><li>• <b>Choose</b> a suitable C-construct to develop C code for a given problem</li><li>• <b>Apply</b> the C-language syntax rules to correct the bugs in the C program</li><li>• <b>Develop</b> simple C programs to illustrate the applications of different data types such as arrays, pointers, functions.</li></ul>											
Course Outcome: After the completion of the course, students will be able to							Domain		Level		
CO1	Illustrate and explain the basic computer concepts and programming principles of C language.						Cognitive		Apply		
CO2	Determine C programs to solve simple mathematical and decision making problems.						Cognitive		Apply		
CO3	Demonstrate the applications of derived data types such as arrays, pointers, strings and functions.						Cognitive		Apply		
CO4	To solve a problem into functions and synthesize a complete program using divide and conquer approach.						Cognitive		Apply		
CO5	Apply programming concepts to solve programs using files and store and retrieve data from it.						Cognitive		Apply		
COURSE CONTENT											
UNIT- I		PROGRAMMING FUNDAMENTALS AND I/O STATEMENTS								9	
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.											
UNIT - II		CONTROL STRUCTURE AND ARRAYS								9	
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.											

UNIT - III	FUNCTIONS AND POINTERS										9			
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														
UNIT - IV	STRUCTURES AND UNIONS										9			
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.														
UNIT - V	FILES										9			
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.														
									L	T	P	Total		
									45	0	0	45		
TEXT BOOKS														
1. Byron Gottfried, “Programming with C”, Schaum's Outlines Series, McGraw Hill Education, 3rd Edition, 2017.														
2. ReemaThareja, “Programming in C”, Oxford university press, 2nd Edition, 2016														
REFERENCE BOOKS														
1. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill, 7 <sup>th</sup> edition 2017.														
2. R. S. Bichkar, “Programming with C”, Universities Press, 2nd Edition, 2012.														
3. Stephen G. Kochan, “Programming in C”, Addison-Wesley Professional, 4th Edition, 2014.														
E-REFERENCES														
1. <a href="https://onlinecourses.nptel.ac.in/noc19_cs42/preview">https://onlinecourses.nptel.ac.in/noc19_cs42/preview</a>														
2. <a href="https://www.javatpoint.com/c-programming-language-tutorial">https://www.javatpoint.com/c-programming-language-tutorial</a>														
3. <a href="https://www.w3schools.in/c-tutorial/">https://www.w3schools.in/c-tutorial/</a>														
Mapping of CO with PO’s														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO1	PSO2
CO 1	2	2	0	0	2	0	0	0	0	0	2	2	1	0
CO 2	2	2	0	0	2	0	0	0	0	0	2	2	1	0
CO 3	2	2	1	2	2	0	0	0	0	0	2	2	1	0
CO 4	2	2	1	2	2	0	0	0	0	0	2	2	1	0
CO 5	2	2	1	0	2	0	0	1	0	0	2	2	1	0
Total	10	10	3	4	10	0	0	1	0	0	10	10	5	0
Scaled Value	2	2	1	1	2	0	0	1	0	0	2	2	2	0

1 – 5 → 1,                      6 – 10 → 2,                      11 – 15 → 3  
0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE		XAP203	L	T	P	C
COURSE NAME		APPLIED PHYSICS FOR ENGINEERS	3	1	0	4
C:P:A		2.8:0.8:0.4	L	T	P	H
PREREQUISITE:		Basic Physics in HSC level	3	1	0	4
COURSE OUTCOMES			Domain		Level	
CO1	Identify the basics of mechanics, <i>explain</i> the principles of elasticity and <i>determine</i> its significance in engineering systems and technological advances.		Cognitive		Understand	
CO2	Illustrate the laws of electrostatics, magneto-statics and electromagnetic induction; <i>use</i> and <i>locate</i> basic applications of electromagnetic induction to technology.		Cognitive		Analyze	
CO3	Understand the fundamental phenomena in optics by measurement and <i>describe</i> the working principle and application of various lasers and fibre optics.		Cognitive		Apply	
CO4	Analyze energy bands in solids, <i>discuss</i> and <i>use</i> physics principles of latest technology using semiconductor devices.		Cognitive		Analyze	
CO5	Develop Knowledge on particle duality and <i>solve</i> Schrodinger equation for simple potential.		Cognitive		Apply	
UNIT - I MECHANICS OF SOLIDS						9+3
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
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
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 <sub>2</sub> 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).						

<b>UNIT –IV SEMICONDUCTOR PHYSICS</b>				<b>9+3</b>
<b>Semiconductors:</b> 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.				
<b>Diodes and Transistors:</b> 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.				
<b>UNIT –V QUANTUM PHYSICS</b>				<b>9+3</b>
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.				
<b>TEXT BOOKS</b>				
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.				
<b>REFERENCE BOOKS</b>				
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.				
<b>E RESOURCES</b>				
NPTEL , Engineering Physics, Prof. M. K. Srivastava, Department of Physics, IIT, Roorkee.				
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL HOURS</b>
	<b>45</b>	<b>15</b>	<b>-</b>	<b>60</b>

#### Mapping of CO's with GA's:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	2	2	2	1	0	0	0	1	0	0	1
<b>CO2</b>	3	0	1	0	1	0	0	0	0	0	0	1
<b>CO3</b>	3	2	2	2	1	0	0	0	1	0	0	1
<b>CO4</b>	3	2	2	2	1	0	0	0	1	0	0	1
<b>CO5</b>	3	0	2	0	0	0	0	0	0	0	0	1
<b>Total</b>	<b>15</b>	<b>6</b>	<b>9</b>	<b>6</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>5</b>
<b>Scaled value</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>

COURSE CODE	XGS204	L	T	P	SS	C
COURSE NAME	TECHNICAL COMMUNICATION	2	0	0	0	2
PRE-REQUISITES		L	T	P	SS	H
C: P: A	3:0:0	2	0	0	0	2
COURSE OUTCOMES:		Domain		Level		
CO1	Ability to understand the basic principles	Cognitive		Remember		
CO2	Apply the techniques in writing	Cognitive		Apply		
CO3	Identify communicative styles	Cognitive		Remember		
CO4	Construct the nature of writing	Cognitive		Create		
UNIT I – Basic Principles					8	
1.1 – Basic Principles of Technical Writing						
1.2 – Styles used in Technical Writing						
1.3 – Language and Tone						
UNIT II – Techniques					8	
2.1 – Special Techniques used in writing						
2.2 – Definition & Description of mechanism						
2.3 – Description- Classification-Interpretation						
UNIT III – Communication					8	
3.1 – Modern development in style of writing						
3.2 - New letter writing formats						
UNIT IV – Report Writing					6	
4.1 – Types of Report writing						
4.2 – Project writing formats						
Suggested Readings:						
(i) John Sealy, Writing and Speaking Author; Oxford University Press, New Delhi, 2019.						
(ii) Williams K.S, Communicating Business. Engage Learning India Pvt Ltd, 2012.						

#### Mapping of COs with GAs:

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	3	0	0	0	2	0	0	1	1	3	0	3
<b>CO2</b>	2	0	0	0	1	0	0	1	2	3	0	3
<b>CO3</b>	2	0	0	0	2	0	0	1	3	3	0	3
<b>CO4</b>	3	0	0	0	2	0	0	1	3	3	0	3
<b>Total</b>	10	0	0	0	7	0	0	4	9	12	2	12
<b>Scale</b>	3	0	0	0	2	0	0	1	2	3	1	3

1-5 = 1, 6-10 = 2, 11-15 = 3

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

<b>COURSE CODE</b>		<b>XWP205</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>		<b>WORKSHOP PRACTICES</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>3</b>
<b>PRE-REQUISITES</b>		<b>--</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>		<b>`1:2:0</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>5</b>
<b>Course Outcome</b>			<b>Domain/Level C or P or A</b>			
<b>CO1</b>	<i>Summarize</i> the machining methods and <i>Practice</i> machining operation.		Cognitive Psychomotor		Understand Guided Response	
<b>CO2</b>	<i>Defining</i> metal casting process, moulding methods and <b>relates</b> Casting and Smithy applications.		Cognitive Psychomotor		Understand Guided Response	
<b>CO3</b>	<i>Plan</i> basic carpentry operations and <i>Practice</i> carpentry operations.		Cognitive Psychomotor		Understand Guided Response	
<b>CO4</b>	<i>Plan</i> basic fitting operations and <i>Practice</i> fitting operations.		Cognitive Psychomotor		Understand Guided Response	
<b>CO5</b>	<i>Summarize</i> metal joining operation and <i>Practice</i> welding operation.		Cognitive Psychomotor		Understand Guided Response	
<b>CO6</b>	<i>Illustrate</i> the electrical and electronics basics and <i>Makes</i> appropriate connections.		Cognitive Psychomotor		Understand Guided Response	
<b>COURSE CONTENT</b>						
<b>EXP.NO</b>	<b>TITLE</b>					<b>CO RELATION</b>
1	Introduction to machining process					<b>CO1</b>
2	Plain turning using lathe operation					<b>CO1</b>
3	Introduction to CNC					<b>CO1</b>
4	Demonstration of plain turning using CNC					<b>CO1</b>
5	Study of metal casting operation					<b>CO2</b>
6	Demonstration of moulding process					<b>CO2</b>
7	Study of smithy operation					<b>CO2</b>
8	Study of carpentry tools					<b>CO3</b>
9	Half lap joint – Carpentry					<b>CO3</b>
10	Mortise and Tenon joint – Carpentry					<b>CO3</b>
11	Study of fitting tools					<b>CO4</b>
12	Square fitting					<b>CO4</b>
13	Triangular fitting					<b>CO4</b>
14	STUDY OF WELDING TOOLS					<b>CO5</b>
15	Square butt joint – welding					<b>CO5</b>
16	Tee joint – Welding					<b>CO5</b>
17	Introduction to house wiring					<b>CO6</b>

18	One lamp controlled by one switch	<b>CO6</b>
19	Two lamps controlled by single switch	<b>CO6</b>
20	Staircase wiring	<b>CO6</b>
<b>TEXT BOOKS</b>		
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.		
<b>REFERENCES</b>		
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. Raghuvanshi, Dhanpat Rai and Co., New Delhi. 4. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi.		
<b>E RESOURCES</b>		
1. <a href="http://nptel.ac.in/courses/112107145/">http://nptel.ac.in/courses/112107145/</a>		

### **MAPPING OF COs WITH GAs**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	2	1	2	1	1	0	1	0	1	0	2	1
<b>CO2</b>	2	1	2	1	1	0	1	0	1	0	2	1
<b>CO3</b>	2	1	2	1	1	0	1	0	1	0	2	1
<b>CO4</b>	2	1	2	1	1	0	1	0	1	0	2	1
<b>CO5</b>	2	1	2	1	1	0	1	0	1	0	2	1
<b>CO6</b>	2	1	2	1	1	0	1	0	1	0	2	1
<b>Total</b>	<b>12</b>	<b>6</b>	<b>12</b>	<b>6</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>12</b>	<b>6</b>
<b>Scaled value</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>3</b>	<b>2</b>

1-5 = 1, 6-10 = 2, 11-15 = 3

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

<b>COURSE CODE</b>	<b>XEM206</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>ENGINEERING MECHANICS</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITES</b>	<b>NIL</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A= 3:0:0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

#### **COURSE OBJECTIVES**

*Upon successful completion of the course, student will have:*

- Ability to apply knowledge of mathematics, science, and engineering.
- Ability to design as well as to analyse and interpret data.
- Ability to identify, formulate, and solve engineering problems.
- Ability to apply techniques and resources to solve complex mechanical engineering activities with an understanding of the limitations.

<b>COURSE OUTCOMES</b>		<b>DOMAIN</b>	<b>LEVEL</b>
<b>CO1</b>	<i>Explain</i> the principles forces, laws and their applications.	Cognitive	Apply
<b>CO2</b>	<i>Classification</i> of friction, and <i>apply</i> the forces in Trusses and beams.	Cognitive	Apply
<b>CO3</b>	<i>Explain</i> and <i>Apply</i> moment of Inertia and Virtual work	Cognitive	Apply
<b>CO4</b>	<i>Outline</i> and <i>Examine</i> Dynamics	Cognitive	Apply
<b>CO5</b>	<i>Explain</i> free and forced vibration	Cognitive	Understand

<b>UNIT I</b>	<b>INTRODUCTION TO ENGINEERING MECHANICS</b>	<b>9</b>
Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static indeterminacy.		
<b>UNIT II</b>	<b>FRICTION AND BASIC STRUCTURAL ANALYSIS</b>	<b>9</b>
Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack; Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines.		
<b>UNIT III</b>	<b>CENTROID , CENTRE OF GRAVITY AND VIRTUAL WORK AND ENERGY METHOD</b>	<b>9</b>
Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook. Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of		

energy method for equilibrium. Stability of equilibrium.			
UNIT IV	REVIEW OF PARTICLE DYNAMICS AND INTRODUCTION TO KINETICS OF RIGID BODIES		9
Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton’s 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique). Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D’Alembert’s principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid bodyrotation.			
UNIT V	MECHANICAL VIBRATIONS		9
Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums.			
TEXT BOOKS			
1.	Hisrich, 2016, Entrepreneurship, Tata McGraw Hill, New Delhi.		
2.	S.S.Khanka, 2013, Entrepreneurial Development, S.Chand and Company Limited, New Delhi.		
REFERENCE BOOKS			
1.	Mathew Manimala, 2005, Entrepreneurship Theory at the Crossroads, Paradigms & Praxis, Biztrantra ,2nd Edition.		
2.	Prasanna Chandra, 2009, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill.		
3.	P.Saravanavel, 1997, Entrepreneurial Development, Ess Pee kay Publishing House, Chennai.		
4.	Arya Kumar,2012, Entrepreneurship: Creating and Leading an Entrepreneurial organisation, Pearson Education India.		
5.	Donald F Kuratko, T.V Rao, 2012, Entrepreneurship: A South Asian perspective, Cengage Learning India.		
6.	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.		
E-REFERENCES			
1.	Jeff Hawkins, “Characteristics of a successful entrepreneur”, ALISON Online entrepreneurship courses, “https://alison.com/learn/entrepreneurial-skills		
2.	Jeff Cornwall, “Entrepreneurship -- From Idea to Launch”, Udemy online Education, https://www.udemy.com/entrepreneurship-from-idea-to-launch/		
LECTURE: 45		TUTORIAL: 0	PRACTICAL: 0
			TOTAL:45

### MAPPING OF COs WITH GAs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1	3	2	1	2	1	2	1	3
CO2	3	2	1	1	3	2	1	2	1	2	1	3
CO3	3	2	1	1	3	2	1	2	1	2	1	3
CO4	3	2	1	1	3	2	1	2	1	2	1	3
CO5	2	2	2	1	3	2	1	3	1	1	1	3
Total	14	10	6	5	15	10	5	11	5	9	5	15
Scaled Value	3	2	2	1	3	2	1	3	1	2	1	3

1-5 = 1, 6-10 = 2, 11-15 = 3

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

<b>COURSE CODE</b>		<b>XCP207</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>		<b>PROGRAMMING FOR PROBLEM SOLVING LABORATORY</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>PREREQUISITES</b>		<b>Basic Mathematics knowledge, Analytical, Logical skill</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C</b>	<b>P</b>	<b>A</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>1</b>	<b>0</b>	<b>0</b>				
<b>LEARNING OBJECTIVES</b> <ul style="list-style-type: none"> <li>Acquire knowledge about to solve basic problems by understanding basic concepts in C like operators, control statements etc.</li> <li>To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.</li> <li>Design and implement programs to store data in structures and files.</li> </ul>						
<b>COURSE OUTCOMES</b>			<b>DOMAIN</b>		<b>LEVEL</b>	
<b>CO1</b>	<i>Apply</i> the concepts of variables, data types, operators and expressions.		Cognitive		Apply	
<b>CO2</b>	<i>Demonstrate</i> the usage of Conditional and Unconditional statements.		Cognitive		Apply	
<b>CO3</b>	<i>Demonstrate</i> the usage of functions and relate functions with respect to arrays and strings.		Cognitive		Apply	
<b>CO4</b>	<i>Implement</i> the concept of pointers and structures.		Cognitive		Apply	
<b>CO5</b>	<i>Demonstrate</i> the usage of files and Command Line Arguments.		Cognitive		Apply	

<b>S.NO</b>	<b>List of Experiments</b>	<b>COs</b>
1	Program to display a Leave Letter as per proper format	CO1
2	i. Program for addition of two numbers ii. Program to solve any mathematical formula.	CO1
3	Program to find greatest of 3 numbers using Branching Statements	CO2
4	Program to display divisible numbers between n1 and n2 using looping Statement	CO2
5	Program to search an array element in an array.	CO2
6	Program to find largest / smallest element in an array.	CO2
7	Program to perform string operations.	CO3
8	Program to find area of a rectangle of a given number use four function types.	CO3
9	Programs to pass and receive array and pointers using four function types	CO3
10	Programs using Recursion for finding factorial of a number	CO3
11	Program to read and display student mark sheet of a student structures with variables	CO4
12	Program to read and display student marks of a class using structures with arrays	CO4
13	Program to create linked list using structures with pointers	CO4

14	Program for copying contents of one file to another file.		CO5	
15	Program using files to store and display student mark list of a class using structures with array		CO5	
HOURS		TUTORIAL	PRACTICAL	TOTAL
		0	30	30

### Mapping of CO with PO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO 1</b>	2	2	0	0	2	0	0	0	0	0	2	2	1	0
<b>CO 2</b>	2	2	0	0	2	0	0	0	0	0	2	2	1	0
<b>CO 3</b>	2	2	1	2	2	0	0	0	0	0	2	2	1	0
<b>CO 4</b>	2	2	1	2	2	0	0	0	0	0	2	2	1	0
<b>CO 5</b>	2	2	1	0	2	0	0	0	0	0	2	2	1	0
<b>Total</b>	10	10	3	4	10	0	0	0	0	0	10	10	5	0
<b>Scaled Value</b>	2	2	1	1	2	0	0	0	0	0	2	2	1	0

0- No relation

1- Low relation

2- Medium relation

3- High relation

<b>COURSE CODE</b>	<b>XAP208</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>APPLIED PHYSICS FOR ENGINEERS LABORATORY</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>C:P:A</b>	<b>1:0.8:0.2</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>PREREQUISITE:</b>	<b>Basic Physics in HSC level</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>COURSE OUTCOMES</b>		<b>Domain</b>		<b>Level</b>	
CO1	<i>Determine</i> the significance of elasticity in engineering systems and technological advances.	Cognitive Psychomotor		Understand Mechanism	
CO2	<i>use</i> and <i>locate</i> basic applications of electromagnetic induction to technology.	Cognitive Psychomotor Affective		Understand Mechanism Respond	
CO3	<i>Describe</i> the working principle and application of various lasers and fibre optics.	Cognitive Psychomotor		Understand Mechanism	
CO4	<i>use</i> physics principles of latest technology using semiconductor devices.	Cognitive Psychomotor		Understand Mechanism	

### **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. UmayalSundari AR., "Applied Physics Laboratory Manual", PMU Press, Thanjavur, 2012.

	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL HOURS</b>
	<b>0</b>	<b>0</b>	<b>30</b>	<b>30</b>

### Mapping of CO's with GAs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	2	2	2	1	0	0	0	1	0	0	1
<b>CO2</b>	3	0	1	0	1	0	0	0	0	0	0	1
<b>CO3</b>	3	2	2	2	1	0	0	0	1	0	0	1
<b>CO4</b>	3	2	2	2	1	0	0	0	1	0	0	1
<b>Total</b>	<b>12</b>	<b>6</b>	<b>7</b>	<b>6</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>5</b>
<b>Scaled value</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>

### SEMESTER – III

<b>COURSE CODE</b>			<b>XPS301</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>			<b>PROBABILITY AND STATISTICS</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE: Nil</b>							
<b>Learning Objectives</b> <ol style="list-style-type: none"> <li>1. Appreciate the importance of probability and statistics in computing and research.</li> <li>2. Develop skills in presenting quantitative data using appropriate diagrams, tabulations and summaries and to use appropriate statistical method in the analysis of simple datasets.</li> <li>3. Interpret and clearly present output from statistical analyses in a clear concise and understandable manner.</li> <li>4. The main objective of this course is to provide students with the foundations of probabilities and statistical analysis mostly used in varied applications in engineering and science like disease modeling, climate prediction and computer networks etc.</li> </ol>							
<b>Course outcomes:</b>				<b>Domain</b>		<b>Level</b>	
<b>CO1</b>	<b>Explain</b> conditional probability, independent events; <b>find</b> expected values and Moments of Discrete random variables with properties.			Cognitive		Understand	
<b>CO2</b>	<b>Find</b> distribution function, Marginal density function, conditional density function, <b>Define</b> density function of conditional distribution functions normal, exponential and gamma distributions.			Cognitive		Remember	
<b>CO3</b>	<b>Find</b> measures of central tendency, statistical parameters of Binomial, Poisson and Normal, correlation, regression. Rank Correlation coefficient of two variables.			Cognitive		Remember	
<b>CO4</b>	<b>Explain</b> large sample test for single proportion, difference of proportion, single mean, difference of means and difference of standard deviations with simple problems.			Cognitive		Understand	
<b>CO5</b>	<b>Explain</b> small sample test for single mean, difference of mean and correlation coefficients, variance test, chi-square test with simple problems.			Cognitive		Understand	

<b>UNIT I: Basic Probability</b>	<b>9</b>
Probability spaces, conditional probability, independence, Discrete random variables, Independent random variables, Poisson approximation to the binomial distribution, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum.	
<b>UNIT II: Continuous Probability Distributions &amp; Bivariate Distributions</b>	<b>9</b>
Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities. Bivariate distributions and their properties, conditional densities.	
<b>UNIT III: Basic Statistics</b>	<b>9</b>
Probability distributions: Binomial, Poisson and normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.	

<b>UNIT IV: Test for Large Sample</b>			<b>9</b>
Test of significance: large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.			
<b>UNIT V: Test for Small Sample</b>			<b>9</b>
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.			
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>45</b>	<b>-</b>	<b>45</b>
<b>TEXTBOOKS</b>			
1. Veerarajan T., “Probability, Statistics and Random Processes”, Tata McGraw-Hill, New Delhi, 2010. 2. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 43 <sup>rd</sup> Edition, 2015.			
<b>REFERENCES</b>			
1. Erwin Kreyszig, “Advanced Engineering Mathematics”, 9 <sup>th</sup> 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”, 6 <sup>th</sup> Ed., Pearson Education India, 2002. 4. W. Feller, “An Introduction to Probability Theory and its Applications”, Vol. 1, 3 <sup>rd</sup> Ed., Wiley, 1968. 5. N.P. Bali and Manish Goyal, “A text book of Engineering Mathematics”, Laxmi Publications, Reprint, 2010.			
<b>E – REFERENCE - (Nptel)</b> Probability and Statistics by Prof.Somesh kumar, Department of Mathematics, IIT Kharagpur. ( <a href="http://nptel.ac.in/noc/noc_courselist.php">http://nptel.ac.in/noc/noc_courselist.php</a> )			

### Mapping of COs and GAs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO 1</b>	3	2	1	0	0	0	0	0	1	1	0	1
<b>CO 2</b>	3	2	1	0	0	0	0	0	1	1	0	1
<b>CO 3</b>	3	2	1	1	0	0	0	0	1	1	0	1
<b>CO 4</b>	3	2	1	1	1	1	0	0	1	1	1	1
<b>CO 5</b>	3	2	1	1	1	1	1	0	1	1	1	1
<b>Total</b>	<b>15</b>	<b>10</b>	<b>5</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>5</b>	<b>2</b>	<b>5</b>
<b>Scaled value</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

1-5→1, 6-10 → 2, 11-15 → 3

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

Semester				:		III				L	T	P	C	
Course Code				:		XCS302				3	1	0	4	
Course Name				:		DIGITAL ELECTRONICS								
Prerequisite				:		Nil								
C	P	A									L	T	P	H
3	0	0									3	1	0	4
Course Objectives														
•		• Recall and Recognize number system conversions												
•		• Demonstrate the operation of logic gates, Boolean algebra simplification and karnaugh map reduction												
•		• Describe, Illustrate and Analyze Combinational, Sequential logic circuits and memory devices												
Course Outcome: After the completion of the course, students will be able to										Domain		Level		
CO1	Describe the numerical values in various number systems and perform number conversions between different number systems.										Cognitive		Understand	
CO2	Demonstrate the operation of logic gates, Boolean algebra simplification and karnaugh map reduction										Cognitive		Apply	
CO3	Identify, Analyze and Design the combinational and sequential circuits										Cognitive		Analyze	
CO4	Analyze and Design the sequential digital circuits like flip-flops, registers, counters										Cognitive		Analyze	
CO5	Explain the nomenclature and technology in the area of memory devices										Cognitive		Understand	
COURSE CONTENT														
UNIT I		NUMBER SYSTEMS												
		Review of Number Systems– Binary Arithmetic – Binary addition – Unsigned and Signed numbers – one’s and two’s complements of Binary numbers – Arithmetic operations with signed numbers – Number system conversions – Digital codes.												
UNIT II		BOOLEAN ALGEBRA & LOGIC SIMPLIFICATION												
		Logic gates – AND, OR,NOT,NAND, NOR, XOR and XNOR Gates – Laws and Rules of Boolean algebra – DeMorgan’s Theorems – Standard forms of Booleans Expressions – Sum of products – Product of sums – Boolean Expression and Truth Tables – Boolean Expression Minimization using Boolean laws – The kamaugh Map – Sum of Products and Products of Sum Minimization.												
UNIT III		COMBINATIONAL LOGIC												
		Combinational circuits – Analysis and design procedures – Circuits for arithmetic operations - Code conversion - Decoders and encoders - Multiplexers and Demultiplexers – Introduction to Hardware Description Language (HDL) - HDL for combinational circuits.												
UNIT IV		SEQUENTIAL LOGIC												
		Synchronous Sequential Logic												

	Sequential circuits – Flip flops – Analysis and design procedures - State reduction and state assignment - Shift registers – Counters - HDL for sequential logic circuits. <b>Asynchronous Sequential Logic</b> Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables – Race-free state assignment – Hazards.				
<b>UNIT V</b>	<b>MEMORY AND PROGRAMMABLE LOGIC</b>				
	RAM and ROM- Memory Decoding – Error Detection and Correction – Programmable Logic Array – Programmable Array Logic – Sequential Programmable Devices – Application Specific Integrated Circuits.				
		<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
		<b>45</b>	<b>15</b>	<b>0</b>	<b>60</b>
	<b>TEXT BOOKS</b>				
	1. M.Morris Mano, “Digital Design”, 6 <sup>th</sup> edition, 2018, Pearson Education. 2. Peter Norton. “Introduction to Computers”. 6 <sup>th</sup> Edition, Tata Mc Graw Hill, New Delhi, 2006. 3. Thomas L.Floyd and R.P.Jain, “digital Fundamentals”, 8 <sup>th</sup> Edition, Pearson Education, 2007.				
	<b>REFERENCE BOOKS</b>				
	1. Charles H.Roth, Jr. “Fundamentals of Logic Design”, 6 <sup>th</sup> Edition, Jaico Publishing House. 2. Raj kamal, “Digital System: Principles and Design”, 1 <sup>st</sup> Edition, Pearson Educaion, 2007. 3. Albert Paul Malvino, Donald P.Leech, “Digital Principles and Applications”, 6 <sup>th</sup> Edition, Mc Graw Publishers, 2007. 4. Donald D.Givone, “Digital Principles and Design”, Tata McGraw-Hill, 2003.				
	<b>E-REFERENCES</b>				
	1. Digital System Design, Dr.S.Srinivasan, IIT Madras 2. <a href="http://www.deploy.virtual-labs.ac.in/labs/cse15">www.deploy.virtual-labs.ac.in/labs/cse15</a>				

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO 1</b>	3	2	1	0	0	1	0	0	1	0	3	2	1	0
<b>CO 2</b>	0	2	1	0	0	0	0	0	0	1	0	2	1	0
<b>CO 3</b>	1	3	2	0	1	1	0	1	0	2	1	3	2	0
<b>CO 4</b>	3	1	0	0	0	2	0	0	0	1	3	1	0	0
<b>CO 5</b>	0	3	0	2	0	0	0	0	1	1	0	3	0	2
<b>Total</b>	7	11	4	2	1	4	0	1	2	5	7	11	4	2
<b>Scaled Value</b>	2	3	1	1	1	1	0	1	1	1	2	3	1	1
<b>Note:</b>	<b>Total</b>	0		1-5		6-10							11-15	
	<b>Scaled value</b>	0		1		2							3	
	<b>Relation</b>	No		Low		Medium							High	

<b>SEMESTER</b>		:	<b>III</b>													
<b>COURSE CODE</b>		:	<b>XCS303</b>													
<b>COURSE NAME</b>		:	<b>DATA STRUCTURES &amp; ALGORITHMS</b>													
<b>PREREQUISITE</b>		:	<b>PROGRAMMING FOR PROBLEM SOLVING</b>													
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>			<b>C</b>	<b>P</b>	<b>A</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>	
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>			<b>3</b>	<b>0</b>	<b>0</b>			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>Course Objectives</b>																
• To impart the basic concepts of data structures and algorithms																
• To understand basic concepts about linear data structures stack, queue and lists																
• To understand basic concepts about nonlinear data structures trees and graphs																
<i>Course Outcome: After the completion of the course, students will be able to</i>											<b>Domain C or P or A</b>		<b>Level</b>			
<b>CO1</b>	<i>Observe</i> the concept of data structures and analysis of algorithms										Cognitive		Understand			
<b>CO2</b>	<i>Classify</i> and <i>Choose</i> the linear data structures for solving the problems										Cognitive		Understand			
<b>CO3</b>	<i>Classify</i> and <i>Choose</i> the nonlinear data structures trees for solving the problems										Cognitive		Understand			
<b>CO4</b>	<i>Classify</i> and <i>Choose</i> the nonlinear data structures graphs for solving the problems										Cognitive		Understand			
<b>CO5</b>	<i>State</i> and <i>Illustrate</i> appropriate abstract data types and algorithm techniques										Cognitive		Understand			
<b>COURSE CONTENT</b>																
<b>UNIT I</b>		<b>INTRODUCTION</b>													<b>9</b>	
		Preliminaries of algorithm, Algorithm analysis and complexity, Data structure- Definition, types of data structures.														
<b>UNIT II</b>		<b>LINEAR DATA STRUCTURE</b>													<b>9</b>	
		List – Representation of List – Stacks, Representation of stack using array and linked list – Queue, Representation of queue using array and linked list														
<b>UNIT III</b>		<b>NON LINEAR DATA STRUCTURE - TREES</b>													<b>9</b>	
		Basic Tree concept – Operations on Binary trees – Tree traversals – Binary search tree, Implementation – AVL tree – Application.														
<b>UNIT IV</b>		<b>NON LINEAR DATA STRUCTURE - GRAPHS</b>													<b>9</b>	
		Basic terminology – Representation of Graph- Graph traversal – Graph Algorithms.														
<b>UNIT V</b>		<b>ALGORITHM DESIGN TECHNIQUES</b>													<b>9</b>	
		Divide and Conquer algorithms, Dynamic Programming, Greedy algorithms, Backtracking and Branch &bound.														
												<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>	
												<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>	

**TEXT BOOKS**

1. Data Structures Using C and C++ 2e, Pearson Education India, 2015
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, 2007.
3. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Computer Algorithms", Galgotia Publications Pvt. Ltd., 2002.
4. Jean-Paul Tremblay & Paul G. "An Introduction to Data Structures with Applications". Sorenson Publisher-Tata McGraw Hill.

**REFERENCE BOOKS**

1. A.V. Aho, J.E. Hopcroft and J.D. Ullman "Data Structures and Algorithms" Pearson Education Delhi, 2002
2. Data Structures and Algorithms, 2008, G. A. V. Pai, TMH

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1. [www.tutorialspoint.com](http://www.tutorialspoint.com)
2. [www.nptel.com](http://www.nptel.com)
3. [www.virtuallab.ac.in](http://www.virtuallab.ac.in)
4. [www.mhhe.com/engcs/compsci/forouzan/](http://www.mhhe.com/engcs/compsci/forouzan/)

**Mapping of CO with PO's**

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
<b>CO 1</b>	3	1	1	1	1	0	0	0	0	0	1	1	3	0
<b>CO 2</b>	3	2	1	1	1	0	0	0	1	0	1	1	3	2
<b>CO 3</b>	3	1	1	1	1	0	0	0	1	0	1	1	3	2
<b>CO 4</b>	3	2	1	2	1	0	0	0	1	0	1	1	3	2
<b>CO 5</b>	3	1	1	2	0	0	0	0	1	0	1	2	3	2
<b>Total</b>	15	7	5	7	4	0	0	0	4	0	5	6	15	8
<b>Scaled Value</b>	3	2	1	2	1	0	0	0	1	0	1	2	3	2

<b>Note:</b>	<b>Total</b>	0	1-5	6-10	11-15				
	<b>Scaled value</b>	0	1	2	3				
	<b>Relation</b>	No	Low	Medium	High				

SEMESTER				:	III											
COURSE CODE				:	XCS304											
COURSE NAME				:	OBJECT ORIENTED PROGRAMMING											
PREREQUISITE				:	PROGRAMMING FOR PROBLEM SOLVING											
	L	T	P	C			C	P	A			L	T	P	H	
	3	0	0	3			3	0	0			3	0	0	3	
Course Objectives																
• To explore the Object Oriented Programming concepts and Java .																
Course Outcome: After the completion of the course, students will be able to											Domain		Level			
CO1	To understand the basic concepts of OOP.										Cognitive		Understand			
CO2	To understand the concept of Java.										Cognitive		Apply			
CO3	To apply the concepts of Inheritance and Packages.										Cognitive		Apply			
CO4	To apply the concepts of Applets and Swing.										Cognitive		Apply			
CO5	To create a Database Connectivity and Networking.										Cognitive		Apply			
COURSE CONTENT																
UNIT I		INTRODUCTION TO OOP												9		
		Object Oriented Programming, Classes and objects, Encapsulation, Inheritance, Abstract data types, ADT implementation- Constructors and destructors, Function and operator overloading, Overriding, inheritance, functions and polymorphism.														
UNIT II		INTRODUCTION TO JAVA												9		
		Introduction to Java, Data Types in Java, Variables in Java, Operators and Control Statements, Control Flow Statements, Arrays and Strings: Arrays; String Handling; Special String Operations; Character Extraction; String Comparison; Searching Strings; String Modification, String Buffer														
UNIT III		INHERITANCE AND PACKAGES												9		
		Inheritance, Package and Interface, Types of Relationships, Significance of Generalization, Inheritance in Java, Access Specifiers, The Abstract Class; Packages, defining a Package, Classpath, Interface, Defining an Interface, Some Uses of Interfaces, Interfaces versus Abstract Classes. Exception Handling in Java, Thread.														
UNIT IV		APPLETS AND SWING												9		
		The Applet Class; The Applet and HTML; Life Cycle of an Applet; The graphics Class; Painting the Applet; User Interfaces for Applet; Adding Components to user interface; AWT (Abstract Windowing Toolkit) Controls, Swing: Concepts of Swing; Java Foundation Class (JFC); Swing Packages and Classes; Working with Swing- An Example; Swing Components.														
UNIT V		DATABASE CONNECTIVITY AND NETWORKING												9		
		Java Data Base Connectivity, Java Data Base Connectivity; Database Management; Mechanism for connecting to a back end database; Loading the ODBC driver, RMI, CORBA and Java Beans,Servlet,JSP - Web														

	Application,Web Architecture.													
									L	T	P	Total		
									45	0	0	45		
TEXT BOOKS														
1. Java: The Complete Reference, Eleventh Edition (PROGRAMMING & WEB DEV - OMG), Herbert Schildt, 11 <sup>th</sup> Edition, McGraw Hill Education, 2019, ISBN: 978-1260440232.														
2. Cay S. Horstmann, Gary cornell, —Core Java Volume –I Fundamentals, 9th Edition, Prentice Hall, 2013.														
3. Java 8 Black Book, 8 <sup>th</sup> edition, D.T. Editorial Services, ISBN-13: 978-9351197584														
REFERENCE BOOKS														
1. Java How to Program, Early Objects (Deitel: How to Program), Paul Deitel and Harvey Deitel, Eleventh Edition, ISBN-13:978-0134743356														
2. Paul Deitel, Harvey Deitel, Java SE 8 for programmers, 3rd Edition, Pearson, 2015.														
3. Steven Holzner, Java 2 Black book, Dreamtech press, 2011.														
4. Timothy Budd, Understanding Object-oriented programming with Java, Updated Edition, Pearson Education, 2000.														
E-REFERENCES														
<a href="https://java-iitd.vlabs.ac.in/List%20of%20experiments.html">https://java-iitd.vlabs.ac.in/List%20of%20experiments.html</a>														
<a href="https://docs.oracle.com/en/java/">https://docs.oracle.com/en/java/</a>														
Mapping of CO with PO's														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	3	3	3	3	2	2	2	1	0	0	2	1	1
CO 2	3	3	3	3	3	2	2	2	1	0	0	2	1	1
CO 3	2	2	2	3	3	3	2	2	1	0	0	1	1	1
CO 4	2	2	2	2	0	0	0	0	0	0	0	0	1	1
CO 5	3	2	3	3	3	0	2	2	2	0	0	0	1	1
Total	13	12	13	14	12	7	8	8	5	0	0	5	5	5
Scaled Value	3	3	3	3	3	2	2	2	1	0	0	1	1	1
Note:	Total		0		1-5		6-10		11-15					
	Scaled value		0		1		2		3					
	Relation		No		Low		Medium		High					

<b>COURSE CODE</b>		<b>XCS305</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>		<b>SIGNALS AND SYSTEMS</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>C:P:A</b>		<b>3:0:0</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
			<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>PREREQUISITES</b>		<b>DIGITAL SIGNAL PROCESSING</b>				
<b>COURSE OUTCOMES</b>			<b>Domain</b>		<b>Level</b>	
<b>CO1</b>	<i>Describe</i> and <i>classify</i> the signals & systems		Cognitive		Understand	
<b>CO2</b>	<i>Find</i> and <i>analyze</i> the properties of continuous time signal using Fourier and Laplace Transform,		Cognitive		Analyze	
<b>CO3</b>	<i>Find</i> and solve the continuous time LTI system performance of Fourier and Laplace Transform.		Cognitive		Apply	
<b>CO4</b>	<i>Find</i> , <i>apply</i> and <i>analyze</i> the properties of discrete time signal using Fourier and Z Transform.		Cognitive		Analyze	
<b>CO5</b>	<i>Explain, Solve</i> and <i>determine</i> the performance of Discrete Time LTI system in Fourier and Z Transform.		Cognitive		Apply	
<b>UNIT I - CLASSIFICATION OF SIGNALS AND SYSTEMS</b>						<b>9</b>
Continuous time signals (CT signals) - Discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Sinusoidal, Exponential, Classification of CT and DT signals - Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals - CT systems and DT systems Classification of systems – Static & Dynamic, Linear & Nonlinear, Time-variant & Time-invariant, Causal & Noncausal, Stable & Unstable.						
<b>UNIT II - ANALYSIS OF CONTINUOUS TIME SIGNAL</b>						<b>9</b>
Fourier series analysis-spectrum of Continuous Time (CT) signals- Fourier and Laplace Transforms in CT Signal Analysis - Properties.						
<b>UNIT III - LINEAR TIME INVARIANT- CONTINUOUS TIME SYSTEMS</b>						<b>9</b>
Differential Equation-Block diagram representation-impulse response, convolution integrals- Fourier and Laplace transforms in Analysis of CT systems.						
<b>UNIT IV - ANALYSIS OF DISCRETE TIME SIGNALS</b>						<b>9</b>
Baseband Sampling of CT signals- Aliasing, Reconstruction of CT signal from DT signals DTFT and properties, Z-transform & properties.						
<b>UNIT V - LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS</b>						<b>9</b>
Difference Equations-Block diagram representation-Impulse response - Convolution sum- Discrete Fourier and Z Transform Analysis of Recursive & Non-Recursive systems.						
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>		
<b>HOURS</b>	<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>		
<b>TEXT BOOKS</b>						
1. Ramesh Babu ,” Signals And Systems” Scitech Publications (India) Pvt Ltd,2018, ISBN-10: 9385983407, ISBN-13: 978-9385983405.						
2. P.Ramakrishna Rao, “Signals and Systems” 2 <sup>nd</sup> Edition, Tata McGraw Hill Publications, 2013.						
3. B.P.Lathi, “Principles of Linear Systems and Signals”, 2 <sup>nd</sup> Edition, Oxford University Press, 2009.						

**REFERENCES**

1. R.EZeimer, W.H.Tranter. and .R.D.Fannin, “Signals & Systems - Continuous and Discrete”, Pearson Education, 2009.
1. John Alan Stuller, “An Introduction to Signals and Systems”, Thomson Learning , 2007.
2. M.J .Roberts, “Signals & Systems Analysis using Transform Methods & MATLAB”, Tata McGraw Hill, 2007.
3. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, “Signals and Systems”, Pearson Education, Indian Reprint, 2007.

**E-REFERENCES**

1. <http://nptel.ac.in/courses/117104074> (Prof.K.S.Venktesh, “NPTEL, Signals and Systems”, IIT-Kanpur)
2. [http://tutorialspoint.com/signals\\_and\\_systems/index.htm](http://tutorialspoint.com/signals_and_systems/index.htm)
3. <http://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/lecture-notes/>

**Mapping of CO with PO's**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO 1</b>	2	3	2	3	2	1	0	0	2	1	0	2	3	2
<b>CO 2</b>	2	3	2	3	2	1	0	0	2	1	0	1	3	2
<b>CO 3</b>	1	3	3	2	1	1	0	0	1	1	0	2	3	2
<b>CO 4</b>	2	2	2	2	2	2	0	0	1	1	0	1	3	2
<b>CO 5</b>	2	3	3	1	1	1	0	0	1	1	0	1	3	2
<b>Total</b>	9	14	12	11	8	6	0	0	7	5	0	7	15	10
<b>Scaled Value</b>	2	3	3	3	2	2	0	0	2	1	0	2	3	2

1 – 5 → 1,                      6 – 10 → 2,                      11 – 15 → 3  
 0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

<b>COURSE CODE</b>	<b>XUM306</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>ENTREPRENEURSHIP DEVELOPMENT</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>
<b>PREREQUISITE:</b>	<b>-</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>
<b>C:P:A</b>	<b>2.7:0:0.3</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>
CO1	<i>Recognise</i> and <i>describe</i> the role of innovation and motivation for an entrepreneur.	Cognitive	Understand		
CO2	<i>Self-assess</i> and <i>appraise</i> your entrepreneurship interest with your chosen entrepreneur.	Cognitive	Evaluate		
CO3	<i>Outline</i> the importance of generation of new ideas for entrepreneurship and <i>illustrate</i> market assessment.	Cognitive	Analyze		
CO4	<i>Explain</i> the competition in business and <i>sketch/demonstrate/comply</i> business model for dealing with competition.	Cognitive	Understand		
CO5	<i>Describe</i> and <i>Explain</i> venture creation and launching of small business and its management.	Cognitive	Understand		
CO6	<i>Describe</i> and <i>Discuss</i> various government policies and global opportunities for Entrepreneurship Development	Cognitive	Understand		
<b>UNIT I- INNOVATION AND ENTREPRENEURSHIP</b>				<b>5 hours</b>	
Definition of Innovation, Creativity and Entrepreneurship; role of innovation in entrepreneurship development (2)- Entrepreneurial motivation (1)-Competencies and traits of an entrepreneur (1)-Role of Family and Society; Entrepreneurship as a career and its role in national development (1)					
<b>UNIT II – SELF ASSESSMENT OF ENTREPRENEURIAL INCLINATION</b>				<b>4 hours</b>	
Self-assessment of entrepreneurial inclination (1)-Presentation by students on their entrepreneurial inclination rating (2)-Case study of successful entrepreneurs (1)					
<b>UNIT III - NEW IDEA GENERATION TO MARKET ASSESSMENT</b>				<b>9 hours</b>	
Importance of Idea generation-filtering-refinement (1)-opportunity recognition (1)-Description of chosen idea - value proposition, customer-problem-Solution statement) (1)-benefits; development status; IP ownership (1)-Market Validation- Technology/ user/decision makers/ partners (1)-market need; segmentation (1)-market TAM,SAM and SOM (1)-case study on market segmentation by popular companies (1)					
<b>UNIT IV- CUSTOMER – COMPETITION- BUSINESS MODEL</b>				<b>9 hours</b>	
Customer-Target primary customer research, Decision making unit/ process-Beach head market; Cost of Customer Acquisition (2)-Competition- comparative analysis, competitive advantages-; (2)-Business model (1) -Financial planning (1)-Pitch documentation and presentation (3)					
<b>UNIT V- VENTURE CREATION AND LAUNCHING OF SMALL BUSINESS AND ITS MANAGEMENT</b>				<b>9 hours</b>	
New enterprise creation - organizational and legal matters (1)-Operational plan (1)-Sales and distribution plan (1)-Accounting (1)-Team recruitment and management (1)-Fund raising and management (1)-Profile of a startup – case studies (2)					

<b>UNIT VI- GOVERNMENT INITIATIVES AND GLOBAL OPPORTUNITIES</b>	<b>9 hours</b>
Incubators and accelerators - capacity building (2)-Startup policies- Startup India (2)-Support for MSME; GeM Portal(2) Funding–national and international sources(2)-Bilateral programmes by Govt. of India -Global reach for promoting cross-cultural entrepreneurship (1)	
<b>Total</b>	<b>45 Hours</b>
<b>References</b>	
<ol style="list-style-type: none"> <li>1. A.P.Aruna, “Lecture Notes on Entrepreneurship Development”, available as softcopy @ <a href="http://www.brain.net">www.brain.net</a></li> <li>2. Thomas W. Zimmerer, Norman M. Scarborough, “Essentials of Entrepreneurship and Small Business Management”, Pearson; 3rd edition, 2001.</li> <li>3. John Burnett, "Introducing Marketing", Open Text Book available at <a href="http://solr.bccampus.ca:8001/bcc/file/ddbe3343-9796-4801-a0cb-7af7b02e3191/1/Core%20Concepts%20of%20Marketing.pdf">http://solr.bccampus.ca:8001/bcc/file/ddbe3343-9796-4801-a0cb-7af7b02e3191/1/Core%20Concepts%20of%20Marketing.pdf</a></li> <li>4. Toubia, Olivier. “Idea Generation, Creativity, and Incentives”, Marketing Science. Vol. 25. pp.411-425. 10.1287/mksc.1050.0166, 2006.</li> <li>5. Alexander Osterwalder and Yves Pigneur, "Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers", Wiley; 1st edition, 2010.</li> <li>6. Gerardus Blokdyk, "3C's model The Ultimate Step-By-Step Guide" 5starcooks, 2018.</li> </ol>	

### Mapping of CO with GAs

CO/GA	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	0	0	0	0	0	2	0	0	0	0	0
<b>CO2</b>	0	0	0	0	0	0	0	0	0	0	0	2
<b>CO3</b>	1	3	2	1	0	0	1	0	0	0	0	0
<b>CO4</b>	0	2	0	1	0	0	0	1	0	0	0	0
<b>CO5</b>	0	0	0	0	0	0	0	0	1	0	3	0
<b>CO6</b>	0	0	0	2	0	0	0	0	0	0	0	3
<b>Original</b>	4	5	2	4	0	0	3	1	1	0	3	5
<b>Scaled</b>	1	1	1	1	0	0	1	1	1	0	1	1

<b>COURSE CODE</b>	<b>XUM307</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY AND GENDER</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>
<b>PRE-REQUISITES</b>	<b>UNIVERSAL HUMAN VALUES-I (DESIRABLE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A= 3:0:0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>CO1</b>	<i>Explore</i> about the need of value education	Cognitive		Understand	
<b>CO2</b>	<i>Interpret</i> self and body needs and responses to ensure harmony within self	Cognitive		Understand	
<b>CO3</b>	<i>Explore</i> the harmony in the family and society	Cognitive		Understand	
<b>CO4</b>	<i>Explore</i> about the harmony in the nature/existence	Cognitive		Understand	
<b>CO5</b>	<i>Discuss</i> about the holistic understanding	Cognitive		Understand	

## 1. COURSES ON HUMAN VALUES

During the Induction Program, students would get an initial exposure to human values through Universal Human Values-I. This exposure is to be augmented by this compulsory full semester foundation course.

### *Objective*

This introductory course input is intended:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspiration so fall human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Thus, this course is intended to provide a much needed orientation input in value education to the young enquiring minds.

### *Salient Features of the Course*

The salient features of this course are:

1. It presents a universal approach to value education by developing the right

understanding of reality (i.e. a worldview of the reality “as it is”) through the process of self-exploration.

2. The whole course is presented in the form of a dialogue whereby a set of proposals about various aspects of the reality are presented and the students are encouraged to self-explore the proposals by verifying them on the basis of their natural acceptance within oneself and validate experientially in living.
3. The prime focus throughout the course is toward affecting a qualitative transformation in the life of the student rather than just a transfer of information.
4. While introducing the holistic world view and its implications, a critical appraisal of the prevailing notions is also made to enable the students discern the difference on their own right.

### ***Course Methodology***

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. The course is in the form of 28 lectures (discussions) and 14 practice sessions.
3. It is free from any dogma or value prescriptions.
4. It is a process of self-investigation and self-exploration, and not of giving sermons. Whatever is found as truth or reality is stated as a proposal and the students are facilitated to verify it in their own right, based on their Natural Acceptance and subsequent Experiential Validation – the whole existence is the lab and every activity is a source of reflection.
5. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution.
6. This self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs.

### ***2. COURSE TOPICS***

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher’s Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

The syllabus for the lectures and practice sessions is given below:

#### ***Module 1 – Introduction to Value Education (6 lectures and 3 tutorials for practice session)***

**Lecture1:** Understanding Value Education

**Lecture2:** Self-exploration as the Process for Value Education

**Tutorial 1: Practice Session PS1**     *Sharing about Oneself*

**Lecture3:** Continuous Happiness and Prosperity– the Basic Human Aspirations

**Lecture 4:** Right Understanding, Relationship and Physical Facility

**Tutorial 2: PracticeSessionPS2**      *Exploring Human Consciousness*

**Lecture 5:** Happiness and Prosperity– Current Scenario

**Lecture 6:** Method to Fulfill the Basic Human Aspirations

**Tutorial 3: Practice Session PS3**      *Exploring Natural Acceptance*

***Expected outcome:***

The students start exploring themselves: get comfortable with each other and with the teacher; they start appreciating the need and relevance for the course.

The students start finding that technical education without study of human values can generate more problems than solutions. They also start feeling that lack of understanding of human values is the root cause of most of the present-day problems; and a sustained solution could emerge only through understanding of value-based living. Any solution brought out through fear, temptation of dogma will not be sustainable.

The students are able to see that verification on the basis of natural acceptance and experiential validation through living is the only way to verify right or wrong, and referring to any external source like text or instrument or any other person cannot enable them to verify with authenticity; it will only develop assumptions.

The students are able to see that their practice in living is not in harmony with their natural acceptance most of the time, and all they need to do is to refer to their natural acceptance to overcome this disharmony.

The students are able to see that lack of right understanding leading to lack of relationship is the major cause of problems in their family and not the lack of physical facility in most of the cases, while they have given higher priority to earning of physical facility in their life giving less value to or even ignoring relationships and not being aware that right understanding is the most important requirement for any human being.

***Module 2 – Harmony in the Human Being (6 lectures and 3 tutorials for practice session)***

**Lecture7:** Understanding Human being as the Co-existence of the Self and the Body

**Lecture8:** Distinguishing between the Needs of the Self and the Body

**Tutorial 4: Practice Session PS4** *Exploring the difference of Needs of Self and Body*

**Lecture9:** The Body as an Instrument of the Self

**Lecture10:** Understanding Harmony in the Self

**Tutorial 5: Practice Session PS5**      *Exploring Sources of Imagination in the Self*

**Lecture11:** Harmony of the Self with the Body

**Lecture12:** Programme to ensure self-regulation and Health

**Tutorial 6: Practice Session PS6**      *Exploring Harmony of Self with the Body*

***Expected outcome:***

The students are able to see that they can enlist their desires and the desires are not vague. Also they are able to relate their desires to ‘I’ and ‘Body’ distinctly. If any desire appears

related to both, they are able to see that the feeling is related to I while the physical facility is related to the body. They are also able to see that 'I' and Body are two realities, and most of their desires are related to 'I' and not body, while their efforts are mostly centered on the fulfillment of the needs of the body assuming that it will meet the needs of 'I' too.

The students are able to see that all physical facility they are required for a limited time in a limited quantity. Also they are able to see that in case of feelings, they want continuity of the naturally acceptable feelings and they do not want feelings which are not naturally acceptable even for a single moment.

The students are able to see that activities like understanding, desire, thought and selection are the activities of 'I' only the activities like breathing, palpitation of different parts of the body are fully the activities of the body with the acceptance of 'I' while the activities they do with their sense organs like hearing through ears, seeing through eyes, sensing through touch, tasting through tongue and smelling through nose or the activities they do with their work organs like hands, legs etc. are such activities that require the participation of both 'I' and body.

The students become aware of their activities of 'I' and start finding their focus of attention at different moments. Also they are able to see that most of their desires are coming from outside (through preconditioning or sensation) and are not based on their natural acceptance

The students are able to list down activities related to proper upkeep of the body and practice them in their daily routine. They are also able to appreciate the plants wildly growing in and around the campus which can be beneficial in curing different diseases.

***Module 3 – Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)***

**Lecture13:** Harmony in the Family –the Basic Unit of Human Interaction

**Lecture14:** Values in Human-to-Human Relationship

**Lecture 15:** 'Trust' – the Foundational Value in Relationship

**Tutorial 7: Practice Session PS 7** *Exploring the Feeling of Trust*

**Lecture16:** 'Respect'–as the Right Evaluation

**Tutorial 8: Practice Session PS 8** *Exploring the Feeling of Respect*

**Lecture17:** Understanding Harmony in the Society

**Lecture18:** Vision for the Universal Human Order

**Tutorial 9: Practice Session PS 9** *Exploring Systems to fulfill Human Goal*

***Expected outcome:***

The students are able to note that the natural acceptance (intention) is always for living in harmony, only competence is lacking! We generally evaluate ourselves on the basis of our intention and others on the basis of their competence! We seldom look at our competence and others' intention as a result we conclude that I am a good person and other is a badperson.

The students are able to see that respect is right evaluation, and only right evaluation leads to fulfillment in relationship. Many present problems in the society are an outcome of differentiation (lack of understanding of respect), like gender biasness, generation gap, caste conflicts, class struggle, dominations through power play, communal violence, clash of isms and so on so forth.

All these problems can be solved by realizing that the other is like me a she has the same natural acceptance, potential and program to ensure a happy and prosperous life for them and for others through he may have different body, physical facility or beliefs.

The students are able to use their creativity for education children. The students are able to see that they can play a role in providing value education for children. They are able to put in simple words the issues that are essential to understand for children and comprehensible to them. The students are able to develop an outline of holistic model for social science and compare it with the existing model.

***Module 4 – Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)***

**Lecture19:** Understanding Harmony in the Nature

**Lecture 20:** Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature

**Tutorial 10: Practice Session PS10** *Exploring the Four Orders of Nature*

**Lecture21:** Realizing Existence as Co-existence at All Levels

**Lecture22:** The Holistic Perception of Harmony in Existence

**Tutorial11: Practice Session PS 11** *Exploring Co-existence in Existence*

***Expected outcome:***

The students are able to differentiate between the characteristics and activities of different orders and study the mutual fulfillment among them. They are also able to see that human beings are not fulfilling to other orders today and need to take appropriate steps to ensure right participation (in terms of nurturing, protection and right utilization) in the nature.

The students feel confident that they can understand the whole existence; nothing is a mystery in this existence. They are also able to see the interconnectedness in the nature, and point out how different courses of study relate to the different units and levels. Also they are able to make out how these courses can be made appropriate and holistic.

***Module 5 – Implications of the Holistic Understanding – a Look at Professional Ethics (6lectures and 3 tutorials for practice session)***

**Lecture23:** Natural Acceptance of Human Values

**Lecture24:** Definitiveness of (Ethical) Human Conduct

**Tutorial 12: Practice Session PS 12** *Exploring Ethical Human Conduct*

**Lecture 25:** A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

**Lecture26:** Competence in Professional Ethics

**Tutorial 13: Practice Session PS13** *Exploring Humanistic Models in Education*

**Lecture 27:** Holistic Technologies, Production Systems and Management Models-Typical Case Studies

**Lecture28:** Strategies for Transition towards Value-based Life and Profession

**Tutorial 14: Practice Session PS 14** *Exploring Steps of Transition towards Universal Human Order*

***Expected outcome:***

The students are able to present sustainable solutions to the problems in society and nature. They are also able to see that these solutions are practicable and draw roadmaps to achieve them.

The students are able to grasp the right utilization of their knowledge in their streams of Technology/Engineering/Management/any other area of study to ensure mutual fulfilment. E.g. mutually enriching production system with rest of nature.

The students are able to sincerely evaluate the course and share with their friends. They are also able to suggest measures to make the course more effective and relevant. They are also able to make use of their understanding in the course for the happy and prosperous family and society.

***Guidelines and Content for Practice Sessions (Tutorials)***

In order to connect the content of the proposals with practice (living), 14 practice sessions have been designed. The full set of practice sessions is available in the Teacher's Manual as well as the website.

**Practice Sessions for Module 1 – Introduction to Value Education**

- PS1                Sharing about Oneself
- PS2                Exploring Human Consciousness
- PS3                Exploring Natural Acceptance

**Practice Sessions for Module 2 – Harmony in the Human Being**

- PS4                Exploring the difference of Needs of Self and Body
- PS5                Exploring Sources of Imagination in the Self
- PS6                Exploring Harmony of Self with the Body

**Practice Sessions for Module 3 – Harmony in the Family and Society**

- PS7                Exploring the Feeling of Trust
- PS8                Exploring the Feeling of Respect
- PS9                Exploring Systems to fulfil Human Goal

**Practice Sessions for Module 4 – Harmony in the Nature (Existence)**

- PS10              Exploring the Four Orders of Nature
- PS11              Exploring Co-existence in Existence

**Practice Sessions for Module 5 – Implications of the Holistic Understanding – a Look at Professional Ethics**

- PS12              Exploring Ethical Human Conduct
- PS13              Exploring Humanistic Models in Education
- PS14              Exploring Steps of Transition towards Universal Human Order

As an example, PS7 is a practice session in module 3 regarding trust. It is explained below:

**PS 7:** Form small groups in the class and in that group initiate dialogue and ask the eight questions related to trust. The eight questions are:

1a.DoIwant to make myself happy?	1b. Am I able to make myself always happy?
2a.DoIwant to make the other happy?	2b. Am I able to make the other always happy?
3a.Does the other want to make him happy?	3b. Is the other able to make him always happy?
4a.Does the other want to make me happy?	4b. Is the other able to make me always happy?
<u>Intention(Natural Acceptance)</u>	<u>Competence</u>
What is the answer?	What is the answer?

Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate your intention and competence as well as the others' intention and competence.

**Expected outcome of PS 7:** The students are able to see that the first four questions are related to our Natural Acceptance i.e. intention and the next four to our Competence. They are able to note that the intention is always correct, only competence is lacking! We generally evaluate ourselves on the basis of our intention and others on the basis of their competence! We seldom look at our competence and others' intention, as a result we conclude that I am a good person and other is a bad person.

### 3. READINGS:

#### 3.1 Text Book and Teachers Manual

##### a. The Textbook

*A Foundation Course in Human Values and Professional Ethics*, R R Gaur, RAsthana, G P Bagaria, 2<sup>nd</sup> Revised Edition, Excel Books, New Delhi, 2019. ISBN978-93-87034-47-1

##### b. The Teacher's Manual

Teachers' Manual for *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana, G P Bagaria, 2<sup>nd</sup> Revised Edition, Excel Books, NewDelhi, 2019.ISBN978-93-87034-53-2

#### 3.2 Reference Books

1. Jeevan Vidya:EkParichaya, A Nagaraj, Jeevan VidyaPrakashan,Amarkantak,1999.
2. HumanValues, A.N. Tripathi, NewAge Intl.Publishers, NewDelhi,2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth-by Mohandas Karam chand Gandhi
5. Small is Beautiful -E. F Schumacher.

6. Slow is Beautiful-Cecile Andrews
7. Economy of Permanence-JC Kumarappa
8. Bharat Mein Angreji Raj –Pandit Sunderlal
9. Rediscovering India- by Dharampal
10. Hind Swarajor Indian Home Rule-by Mohandas K.Gandhi
11. India Wins Freedom-Maulana Abdul Kalam Azad
12. Vivekananda-Romain Rolland (English)
13. Gandhi-Romain Rolland(English)

#### **4. MODE OF CONDUCT (L-T-P-C2-1-0-3)**

- Lecture hours are to be used for interactive discussion, placing the proposals about the topic sat hand and motivating students to reflect, explore and verify them.
- Tutorial hours are to be used for practice sessions.
- While analysing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.
- In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.
- Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life.

Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values. It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content.

Additional content may be offered in separate, higher courses.

*This course is to be taught by faculty from every teaching department, including HSS faculty.*

**Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.**

#### **5. SUGGESTEDASSESSMENT:**

***This is a compulsory credit course. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment.***

***etc. will be used in evaluation.***

Example:

Assessment by faculty mentor: 10 marks

Self-assessment: 10 marks

Assessment by peers: 10marks

Socially relevant project/Group Activities/Assignments: 20 marks

Semester End Examination: 50 marks

The overall pass percentage is 40%. In case the student fails, he/she must repeat the course.

## **6. OUTCOME OF THE COURSE:**

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

This is only an introductory foundational input. It would be desirable to follow it up by

- a) Faculty-student or mentor-mentee programs throughout their time with the institution
  - b) Higher level courses on human values in every aspect of living.
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## Mapping of CO with GAs

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	0	2	1	0	0	2	2	3	0	0	0	2
<b>CO2</b>	0	0	0	0	0	2	2	3	0	0	0	2
<b>CO3</b>	0	0	0	0	0	2	2	3	0	0	0	2
<b>CO4</b>	0	0	0	0	0	2	2	3	0	0	0	2
<b>CO5</b>	0	0	0	0	0	2	2	3	0	0	0	2
<b>Total</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>15</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10</b>
<b>Scaled Value</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>

<b>COURSE CODE</b>	<b>XCS308</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	DATA STRUCTURES & ALGORITHMS LABORATORY	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>PREREQUISITES</b>	PROGRAMMING FOR PROBLEM SOLVING	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>	<b>0.5:0.5:0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>LEARNING OBJECTIVES</b> To impart the basic concepts of data structures and algorithms To understand basic concepts about linear data structures stack, queues and lists To understand basic concepts about nonlinear data structures trees and graphs					
<b>COURSE OUTCOMES</b>		<b>DOMAIN</b>		<b>LEVEL</b>	
<b>CO1</b>	<i>Compute</i> the concept of analysing of algorithms	Cognitive Psychomotor		Apply Guided Response	
<b>CO2</b>	<i>Use</i> and <i>Solve</i> the linear data structures for the problems	Cognitive Psychomotor		Apply Guided Response	
<b>CO3</b>	<i>Use</i> and <i>Solve</i> the non-linear data structures trees for the problems	Cognitive Psychomotor		Apply Guided Response	
<b>CO4</b>	<i>Use</i> and <i>Solve</i> the non-linear data structures graphs for the problems	Cognitive Psychomotor		Apply Guided Response	
<b>CO5</b>	<i>Compute</i> the appropriate abstract data types and algorithm techniques	Cognitive Psychomotor		Apply Guided Response	

<b>S.No</b>	<b>List of Experiments</b>	<b>COs</b>		
1	Analysing Searching Algorithm Analysing Sorting Algorithm	CO1		
2	Application of List Stack using Array and Linked List Queue using Array and Linked List	CO2		
3	Tree Traversal Binary Tree Creation	CO3		
4	Graph Traversal Shortest Path Algorithms	CO4		
5	Applications of Algorithm Design Techniques	CO5		
<b>HOURS</b>		<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
		<b>0</b>	<b>30</b>	<b>30</b>

Mapping of CO with PO's														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	1	1	1	1	0	0	0	0	0	1	1	3	0
CO 2	3	2	1	1	1	0	0	0	1	0	1	1	3	2
CO 3	3	1	1	1	1	0	0	0	1	0	1	1	3	2
CO 4	3	2	1	2	1	0	0	0	1	0	1	1	3	2
CO 5	3	1	1	2	0	0	0	0	1	0	1	2	3	2
Total	15	7	5	7	4	0	0	0	4	0	5	6	15	8
Scaled Value	3	2	1	2	1	0	0	0	1	0	1	2	3	2

	Total	0	1-5	6-10	11-15				
	Scaled value	0	1	2	3				
	Relation	No	Low	Medium	High				

SEMESTER			:	III											
COURSE CODE			:	XCS309											
COURSE NAME			:	OBJECT ORIENTED PROGRAMMING LABORATORY											
PREREQUISITE			:	PROGRAMMING IN C											
	L	T	P	C			C	P	A			L	T	P	H
	0	0	1	1			0.5	0.5				0	0	2	2
Course Objectives															
• To explore the principles, algorithms and methods to design and construction of compiler															
Course Outcome: After the completion of the course, students will be able to										Domain C or P or A		Level			
CO1	To understand the basic concepts of OOP.									Cognitive Psychomotor		Understand Guided Response			
CO2	To understand the concept of Java.									Cognitive, Psychomotor		Apply Guided Response			
CO3	To apply the concepts of Inheritance and Packages.									Cognitive Psychomotor		Apply Guided Response			
CO4	To apply the concepts of Applets and Swing.									Cognitive Psychomotor		Apply Guided Response			
CO5	To create a Database Connectivity and Networking.									Cognitive Psychomotor		Apply Guided Response			
LIST OF EXPERIMENTS															
S.NO		LIST OF EXPERIMENTS												CO'S	
UNIT I		INTRODUCTION TO OOP												4	
1		Creating Classes and their Objects constructors and Destructor to create objects.												CO1	
UNIT II		INTRODUCTION TO JAVA												10	
2		3.Function Overriding 4.Inheritance 5.Polymorphism. 6.String Handling												CO2	
UNIT III		INHERITANCE AND PACKAGES												6	
3		7.Learning of abstraction through Interface 8.Learning of Encapsulation through Package 9.Handling Exceptions in Java.												CO3	
UNIT IV		APPLETS AND SWING												6	
4		10.Implementation of Applet 11.Implementation of Swing.												CO4	
UNIT V		DATABASE CONNECTIVITY AND NETWORKING												4	
5		12.Implementation of Database Connectivity. 13.Web Application												CO5	
									Hours	Tutorial		Practical		Total	
										0		30		30	

#### Mapping of CO with PO's

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS01	PS02
CO 1	2	2	2	2	1	1	0	0	2	1	0	2	1	2
CO 2	2	1	1	1	1	1	0	0	2	1	0	1	2	2
CO 3	1	3	2	2	1	1	0	0	1	1	0	2	1	2
CO 4	2	2	2	2	2	1	0	0	1	1	0	1	1	2
CO 5	2	3	3	1	1	1	0	0	1	1	0	1	1	2
Total	9	11	10	8	6	5	0	0	7	5	0	7	6	10
Scaled Value	2	3	2	2	2	1	0	0	2	1	0	2	2	2
Note:	Total		0	1-5		6-10		11-15						
	Scaled value		0	1		2		3						
	Relation		No	Low		Medium		High						

<b>COURSE CODE</b>	<b>XCS310</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>IN-PLANT TRAINING – I</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>C:P:A</b>	<b>0.5:0.5:0</b>				
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<b>COURSE OUTCOMES</b>		<b>Domain</b>	<b>Level</b>
<b>CO1</b>	<i>Relate</i> classroom theory with workplace practice	Cognitive	Understand
<b>CO2</b>	<i>Comply with</i> Factory discipline, management, and business practices.	Psychomotor	Guided Response
<b>CO3</b>	<i>Demonstrates</i> teamwork and time management.	Psychomotor	Guided Response
<b>CO4</b>	<i>Describe</i> and <i>display</i> hands-on experience on practical skills obtained during the programme.	Psychomotor	Perception
<b>CO5</b>	<i>Summarize</i> the tasks and activities done by technical documents and oral presentations	Psychomotor	Guided Response

### CO Vs PO Mapping

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>
<b>CO1</b>	2	0	0	0	0	0	0	0	0	0	0	0
<b>CO2</b>	0	0	0	0	0	0	1	3	0	0	1	0
<b>CO3</b>	0	0	0	0	0	0	0	0	3	1	3	1
<b>CO4</b>	0	1	2	1	3	0	0	0	0	0	0	3
<b>CO5</b>	0	0	0	3	0	0	0	0	0	3	0	1
<b>Total</b>	2	1	2	4	3	0	1	3	3	4	4	5
<b>Scaled</b>	1	1	1	1	1	0	1	1	1	1	1	1

## SEMESTER – IV

<b>COURSE CODE</b>			<b>XCS401</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>			<b>DISCRETE MATHEMATICS</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>2.5</b>	<b>0.5</b>	<b>0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE:</b> Nil							
<b>Learning Objectives</b> <div>5. Be able to understand logical arguments and logical constructs. Have a better understanding of sets, functions and relations</div> <div>6. Be able to construct simple mathematical proofs, Permutations &amp; Combinations.</div> <div>7. Acquire ability to describe computer programme in a format mathematical manner.</div> <div>8. Be able to use effectively algebraic techniques to analyze basic discrete structures and algorithms.</div>							
<b>COURSE OUTCOMES:</b>							
<b>Course outcomes:</b>				<b>Domain</b>	<b>Level</b>		
<b>CO1</b>	<b>Define</b> Sets, Relation, and Function and to explain some simple problems related to that.			Cognitive	Understand		
<b>CO2</b>	<b>Define and Explain</b> Basic counting techniques- inclusion and exclusion, pigeon-hole principle, permutation and combination.			Cognitive	Understand		
<b>CO3</b>	<b>Define and Explain</b> the Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Disjunctive and Conjunctive Normal Form			Cognitive	Understand		
<b>CO4</b>	<b>Define and Explain</b> Algebraic Structures with one Binary Operation and two Binary Operations.			Cognitive	Understand		
<b>CO5</b>	<b>Define and Explain</b> Graphs and their properties.			Cognitive	Understand		

<b>UNIT I: SETS, RELATION AND FUNCTION</b>	<b>9</b>
Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem.	
<b>UNIT II: PRINCIPLES OF MATHEMATICAL INDUCTION</b>	<b>9</b>
The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, Basic counting techniques- inclusion and exclusion, pigeon-hole principle, permutation and combination.	
<b>UNIT III: PROPOSITIONAL LOGIC</b>	<b>9</b>
Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency, Disjunctive and Conjunctive Normal Form.	
<b>UNIT IV: ALGEBRAIC STRUCTURES</b>	<b>9</b>
Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Groups, Permutation Groups, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields.	
<b>UNIT V: GRAPHS AND TREES</b>	<b>9</b>

Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs-Shortest Distances.			
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>
	<b>45</b>	<b>-</b>	<b>45</b>
<b>TEXTBOOKS</b>			
1. Kenneth H. Rosen, “Discrete Mathematics and its Applications”, seventh edition, Tata McGraw – Hill, (12 <sup>th</sup> reprint) 2015. 2. J.P. Tremblay and R. Manohar, “Discrete Mathematical Structure and It’s Application” to Computer Science”, 2 <sup>nd</sup> edition, Tata McGraw-Hill, 1988. 3. C L Liu and D P Mohapatra, “Elements of Discrete Mathematics A Computer Oriented Approach”, 3 <sup>rd</sup> Edition, Tata McGraw – Hill, 1985.			
<b>REFERENCES</b>			
1. Susanna S. Epp, “Discrete Mathematics with Applications”, 5 <sup>th</sup> edition, Cengage Learning India Private Limited, 2021. 2. C.V. Sastry, Rakesh Nayak, “A Textbook on Discrete Mathematics”, Wiley, 2020. 3. Seymour Lipschutz, Marc Lipson, “Schaum's Outline of Discrete Mathematics”, Fourth Edition (Schaum's Outlines) 4th Edition, 2021.			
<b>E REFERENCES</b>			
Nptel: Mathematical Logic by Prof.Arindama Singh, Department of Mathematics, IIT Madras.			

### Mapping of CO with GA's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO 1</b>	3	2	1	0	0	0	0	0	1	1	0	1
<b>CO 2</b>	3	2	1	0	0	0	0	0	1	1	0	1
<b>CO 3</b>	3	2	1	1	0	0	0	0	1	1	0	1
<b>CO 4</b>	3	2	1	1	1	1	0	0	1	1	1	1
<b>CO 5</b>	3	2	1	1	1	1	1	0	1	1	1	1
<b>Total</b>	15	10	5	3	2	2	1	0	5	5	2	5
<b>Scaled value</b>	3	2	1	1	1	1	1	0	1	1	1	1

1-5→1, 6-10 → 2, 11-15 → 3

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

SEMESTER		:	IV														
COURSE CODE		:	XCS402														
COURSE NAME		:	COMPUTER ORGANIZATION AND ARCHITECTURE														
PREREQUISITE		:	ANALOG AND DIGITAL ELECTRONIC CIRCUITS														
	L	T	P	C			C	P	A			L	T	P	H		
	3	1	0	4			3	0	0			3	1	0	4		
Course Objectives																	
<ul style="list-style-type: none"><li>• <b>Understand</b> the digital representation of data in a computer system.</li><li>• <b>Understand</b> the general concepts in digital logic design, including logic elements, and their use in combinational and sequential logic circuit design.</li><li>• <b>Understand</b> the computer arithmetic formulate and <b>solve</b> problems</li></ul>																	
Course Outcome: After the completion of the course, students will be able to											Domain C or P or A		Level				
CO1	Explain the basic organization of a computer system										Cognitive		Understand				
CO2	Describe and Analyze the simple arithmetic and logical units										Cognitive		Analyze				
CO3	Interpret the different ways of communication with I/O devices										Cognitive		Understand				
CO4	Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems										Cognitive		Analyze				
CO5	Categorize the functioning of different sub systems, such as processor, Input/output, and memory										Cognitive		Analyze				
COURSE CONTENT																	
UNIT I		BASIC STRUCTURE OF COMPUTERS														9	
		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.															
UNIT II		ARITHMETIC UNIT														9	
		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.															
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	
		Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage.															

UNIT V	I/O ORGANIZATION												9	
	Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB).													
										L	T	P	Total	
										45	0	0	45	
TEXT/ 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", 6 <sup>th</sup> Edition, Morgan Kaufmann, 2017.														
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, 2017														
Mapping of CO with PO’s														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS01	PS02
CO 1	3	0	2	0	0	1	1	0	0	0	1	1	2	1
CO 2	3	3	3	2	2	1	1	0	0	0	1	1	2	1
CO 3	3	0	2	0	0	1	1	0	0	0	1	1	2	1
CO 4	3	3	3	2	2	1	1	0	0	0	1	1	2	1
CO 5	3	3	3	2	2	1	1	0	0	0	1	1	2	1
Total	15	9	13	6	6	5	5	0	0	0	5	5	10	5
Scaled Value	3	2	3	2	2	1	1	0	0	0	1	1	2	1
Note:	Total		0		1-5		6-10		11-15					
	Scaled value		0		1		2		3					
	Relation		No		Low		Medium		High					

SEMESTER					:	IV											
COURSE CODE					:	XCS403											
COURSE NAME					:	OPERATING SYSTEMS											
PREREQUISITE					:	PROGRAMMING FOR PROBLEM SOLVING, DATA STRUCTURES AND ALGORITHMS											
	L	T	P	C			C	P	A			L	T	P	H		
	3	0	0	3			3	0	0			3	0	0	3		
Course Objectives:																	
• To understand the functions of operating system and their services.																	
• To learn different process scheduling algorithms and process synchronization techniques.																	
• To understand the concept of deadlocks and various memory management schemes.																	
• To learn I/O management and file systems.																	
Course Outcome: After the completion of the course, students will be able to										Domain		Level					
CO1	Describe the functions of operating system and system calls.										Cognitive		Understand				
CO2	Explain the process management concepts and solve the various CPU scheduling algorithms.										Cognitive		Apply				
CO3	Develop solutions to process synchronization problems and deadlock.										Cognitive		Apply				
CO4	Identify the role of paging, virtual memory in operating systems.										Cognitive		Apply				
CO5	Explain the concepts of storage management, disk management and file management.										Cognitive		Understand				
COURSE CONTENT																	
UNIT I		OPERATING SYSTEMS OVERVIEW													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.																	
UNIT II		PROCESS MANAGEMENT													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.																	
UNIT III		PROCESS SYNCHRONIZATION													9		
Process Synchronization: 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. Deadlocks: Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.																	

UNIT IV	MEMORY MANAGEMENT	9								
<b>Memory Management:</b> 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. <b>Virtual Memory:</b> 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).										
UNIT V	I/O SYSTEMS	9								
<b>I/O Hardware:</b> 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. <b>Disk Management:</b> Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks. <b>File Management:</b> Concept of File, Access methods, File types, File operation, Directory structure, File Systemstructure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.										
		<table><tr><td>L</td><td>T</td><td>P</td><td>Total</td></tr><tr><td>45</td><td>0</td><td>0</td><td>45</td></tr></table>	L	T	P	Total	45	0	0	45
L	T	P	Total							
45	0	0	45							
<b>TEXT BOOKS:</b>										
1.Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 10 <sup>th</sup> Edition, John Wiley and Sons Inc., 2018.										
2.William Stallings, “Operating Systems – Internals and Design Principles”, 7 <sup>th</sup> Edition, Prentice Hall, 2012.										

**REFERENCE BOOKS:**

1. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education, 2012.
2. Gary J. Nutt, "Operating Systems: A Modern Perspective", 2<sup>nd</sup> Edition, Addison-Wesley, 2002.
3. Maurice Bach, "Design of the Unix Operating Systems", 8<sup>th</sup> Edition, Prentice-Hall of India, 2012.
4. Daniel P. Bovet, Marco Cesati, "Understanding the Linux Kernel", 3rd Edition, O'Reilly and Associates, 2005.

**E-RESOURCES:**

<https://nptel.ac.in/courses/106108101>

**Mapping of CO with PO's**

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
<b>CO 1</b>	2	1	0	0	0	0	0	0	0	0	0	0	3	2
<b>CO 2</b>	3	2	1	1	1	0	0	0	0	0	0	0	3	2
<b>CO 3</b>	3	2	1	1	1	0	0	0	0	0	0	0	3	2
<b>CO 4</b>	3	2	1	1	1	0	0	0	0	0	0	0	3	2
<b>CO 5</b>	2	1	0	0	1	0	0	0	0	0	0	0	3	2
<b>Total</b>	13	8	3	3	4	0	0	0	0	0	0	0	15	10
<b>Scaled Value</b>	3	2	1	1	1	0	0	0	0	0	0	0	3	2

<b>Note:</b>	<b>Total</b>	0	1-5	6-10	11-15				
	<b>Scaled value</b>	0	1	2	3				
	<b>Relation</b>	No	Low	Medium	High				

<b>SEMESTER</b>		:		<b>IV</b>												
<b>COURSE CODE</b>		:		<b>XCS404</b>												
<b>COURSE NAME</b>		:		<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>												
<b>PREREQUISITES</b>		:		<b>PROGRAMMING FOR PROBLEM SOLVING, DATA STRUCTURE AND ALGORITHMS</b>												
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>			<b>C</b>	<b>P</b>	<b>A</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>	
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>			<b>3</b>	<b>0</b>	<b>0</b>			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>Course Objectives</b>																
<ul style="list-style-type: none"><li>To learn about the process of problem solving.</li></ul>																
<ul style="list-style-type: none"><li>To be conversant with algorithms for common problems.</li></ul>																
<ul style="list-style-type: none"><li>To analyse the algorithms for time/space complexity.</li></ul>																
<ul style="list-style-type: none"><li>To learn to write algorithms for a given problem using different design paradigms.</li></ul>																
<ul style="list-style-type: none"><li>To understand computational complexity of problems.</li></ul>																
<i>Course Outcomes: After the completion of the course, the students will be able to</i>												<b>Domain</b>		<b>Level</b>		
<b>CO1</b>	Explain the basic concepts of algorithms and analyze the performance of algorithms.											Cognitive		Understand		
<b>CO2</b>	Apply divide and conquer strategy for solving suitable problems.											Cognitive		Apply		
<b>CO3</b>	Analyse the algorithms using dynamic programming approach.											Cognitive		Analyze		
<b>CO4</b>	Analyse the complexity of the problems using backtracking algorithm.											Cognitive		Analyze		
<b>CO5</b>	Explain NP completeness and identify different NP complete problems.											Cognitive		Understand		
<b>COURSE CONTENTS</b>																
<b>UNIT I</b>		<b>INTRODUCTION</b>													<b>9</b>	
		Notion of Algorithm - Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and Basic Efficiency Classes- Mathematical Analysis of Non-Recursive Algorithms – Non-recursive solution to the Matrix Multiplication - Mathematical analysis of recursive algorithms – Recursive solution to the Tower of Hanoi Puzzle.														
<b>UNIT II</b>		<b>DIVIDE AND CONQUER TECHNIQUE</b>													<b>9</b>	
		Divide and Conquer Technique – Multiplication of Large Integers – Strassen’s Matrix Multiplication – Closest Pair and Convex Hull Problems – Greedy Method – Prim’s Algorithm – Kruskal’s Algorithm – Dijkstra’s Algorithm.														
<b>UNIT III</b>		<b>DYNAMIC PROGRAMMING</b>													<b>9</b>	
		Dynamic Programming - Computing a Binomial Coefficient – Warshall’s and Floyd’s Algorithm – Application of Warshall’s Algorithm to the Digraph – Floyd’s Algorithm for the All Pairs Shortest Paths Problem - The Knapsack Problem and Memory Function.														
<b>UNIT IV</b>		<b>BACKTRACKING</b>													<b>9</b>	

	Backtracking – N-Queens Problem – Hamiltonian Circuit Problem – Subset Sum Problem – Branch and Bound – Assignment Problem – Knapsack Problem – Traveling Salesman Problem.													
UNIT V	NP COMPLETENESS												9	
	P, NP and NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem – Knapsack problem – Algorithm for solving Nonlinear Equations.													
									L	T	P	Total		
									45	0	0	45		
TEXT BOOKS														
1. S. Sridhar, “Design and Analysis of Algorithms”, Oxford University Press, 2015 2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, Third Edition, MIT Press, 2014. 3. Anany Levitin “Introduction to the Design and Analysis of Algorithms”, 3 <sup>rd</sup> Edition, Pearson Education 2009.														
REFERENCE BOOKS														
1. S.K. Basu, “Design methods and Analysis of Algorithms”, 2 <sup>nd</sup> Edition, Prentice Hall, 2013. 2. Steven S. Skiena, “The Algorithm Design Manual”, Second Edition, Springer, 2010. 3. Robert Sedgewick, Kevin Wayne, “Algorithms”, Fourth Edition, Pearson Education, 2011. 4. Donald E. Knuth, “Art of Computer Programming, Volume I - Fundamental Algorithms”, Third Edition, Addison Wesley, 1997														
E-REFERENCES														
1. <a href="https://nptel.org">https://nptel.org</a> 2. <a href="https://www.coursera.org">https://www.coursera.org</a>														
Mapping of CO with PO’s														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	2	1	2	0	0	0	0	0	0	0	0	0	1	1
CO 2	2	3	2	1	0	0	0	0	0	0	0	0	1	1
CO 3	2	3	2	1	0	0	0	0	0	0	0	0	1	1
CO 4	2	3	2	1	0	0	0	0	1	0	0	0	1	1
CO 5	2	2	2	0	0	0	0	0	1	0	0	0	1	1
Total	10	12	10	3	0	0	0	0	2	0	0	0	5	5
Scaled Value	2	3	2	1	0	0	0	0	1	0	0	0	1	1
Note:	Total		0		1-5		6-10		11-15					
	Scaled value		0		1		2		3					
	Relation		No		Low		Medium		High					

COURSE CODE	XUM009	L	T	P	C
COURSE NAME	ECONOMICS FOR ENGINEERS	3	0	0	3
PREREQUISITE S		L	T	P	H
C:P:A	2.64:0.24:0.12	3	0	0	3
COURSE OUTCOMES		DOMAIN		LEVEL	
CO1	<i>Explain</i> the concepts of economics in engineering and <i>identify</i> element of cost to prepare cost sheet	Cognitive		Understand	
CO2	<i>Calculate and Explain</i> the Break-even point and marginal costing	Cognitive		Understand	
CO3	<i>Summarize</i> and <i>Use</i> value engineering procedure for cost analysis	Cognitive		Understand	
CO4	<i>Estimate</i> replacement problem	Cognitive		Understand	
CO5	<i>Compute, Explain</i> and <i>make Use of</i> different methods of depreciation	Cognitive		Understand	
UNIT I INTRODUCTION TO ECONOMICS					08
Flow in an economy, Law of supply and demand, Concept of Engineering Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics- types of costing, element of costs, preparation of cost sheet and estimation, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost					
UNIT IIBREAK-EVEN ANALYSIS&SOCIAL COST BENEFIT ANALYSIS					12
Margin of Safety, Profit, Cost & Quantity analysis-Product Mix decisions and CVP analysis, Profit/Volume Ratio (P/V Ratio), Application of Marginal costing, Limitations <b>Social Cost Benefit Analysis:</b> compare different project alternatives, Calculate direct, indirect and external effects; Monetizing effects; Result of a social cost benefit analysis.					
UNIT III VALUE ENGINEERING &COST ACCOUNTING:					10
Value engineering – Function, aims, Value engineering procedure - Make or buy decision Business operating costs, Business overhead costs, Equipment operating costs					
UNIT IV REPLACEMENT ANALYSIS					07
Replacement analysis –Types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset.					
UNIT V DEPRECIATION					08
Depreciation- Introduction, Straight line method of depreciation, declining balance method of depreciation-Sum of the year’s digits method of depreciation, sinking fund method of depreciation, Annuity method of depreciation, service output method of depreciation.					
	LECTURE	TUTORIAL		TOTAL	
HOURS	45	0		45	
TEXT BOOKS					
1. Sp Gupta, Ajay Sharma & Satish Ahuja, “Cost Accounting”, V K Global Publications, Faridabad, Haryana, 2012					
2. S.P.Jain&Narang, “Cost accounting – Principles and Practice”, Kalyani Publishers, Calcutta, 2012					
3. PanneerSelvam, R, “Engineering Economics”, Prentice Hall of India Ltd, New Delhi, 2001.					

4. William G.Sullivan, James A.Bontadelli& Elin M.Wicks, “Engineering Economy”, Prentice Hall International, New York, 2001.

#### REFERENCES

1. Luke M Froeb / Brian T Mccann, “ Managerial Economics – A problem solving approach” Thomson learning 2007
2. Truett&Truett, “Managerial economics- Analysis, problems & cases “ Wiley India 8th edition 2004.
3. Chan S.Park, “Contemporary Engineering Economics”, Prentice Hall of India, 2002.
4. Donald.G. Newman, Jerome.P.Lavelle, “Engineering Economics and analysis” Engg. Press, Texas, 2002

#### Mapping of COs with GAs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	1	1	1	3	2	3	2	1	1	3	1	1
<b>CO2</b>	1	0	3	0	0	2	1	0	3	1	0	1
<b>CO3</b>	2	3	1	1	2	3	1	1	1	2	3	1
<b>CO4</b>	1	3	2	3	3	1	3	3	1	1	0	2
<b>CO5</b>	1	1	1	3	1	2	2	1	2	3	3	1
<b>Scaled</b>	6	8	8	10	8	11	9	6	8	9	7	6
<b>Note:</b>	<b>Total</b>	0		1-5		6-10		11-15				
	<b>Scaled value</b>	0		1		2		3				
	<b>Relation</b>	No		Low		Medium		High				

<b>Semester</b>		<b>:</b>		<b>IV</b>												
<b>Course Code</b>		<b>:</b>		<b>XUM003</b>												
<b>Course Name</b>		<b>:</b>		<b>DISASTER MANAGEMENT</b>												
<b>Prerequisite</b>		<b>:</b>		<b>NIL</b>												
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>			<b>C</b>	<b>P</b>	<b>A</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>	
	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>			<b>3</b>	<b>0</b>	<b>0</b>			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<i>Course Outcome: After the completion of the course, students will be able to</i>										<b>Domain C or P or A</b>			<b>Level</b>			
<b>CO1</b>	Understand the concepts of disasters, their significance and types									Cognitive			Understand			
<b>CO2</b>	Understand the relationship between vulnerability, disasters, disaster prevention and risk reduction									Cognitive			Understand			
<b>CO3</b>	Able to understanding of preliminary approaches of Disaster Risk Reduction (DRR)									Cognitive			Understand			
<b>CO4</b>	Develop awareness of institutional processes in the country									Cognitive			Application			
<b>CO5</b>	Develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity									Cognitive			Application			
<b>COURSE CONTENT</b>																
<b>UNIT I</b>		<b>INTRODUCTION TO DISASTERS</b>													<b>6</b>	
		Importance &Significance, Types of Disasters, Climate Change, DM cycle														
<b>UNIT II</b>		<b>RISK ASSESSMENT</b>													<b>12</b>	
		Risk, Vulnerability, Types of Risk, Risk identification, Emerging Risks, Risk Assessment, Damage Assessment, Risk modeling.														
<b>UNIT III</b>		<b>DISASTER MANAGEMENT</b>													<b>10</b>	
		Phases, Cycle of Disaster Management, Institutional Framework, Incident Command System, DM Plan, Community Based DM, Community health and safety, Early Warning and Disaster Monitoring, Disaster Communication, Role of GIS and Remote Sensing, Do's and Don'ts in various disasters.														
<b>UNIT IV</b>		<b>DISASTER RISK MANAGEMENT IN INDIA</b>													<b>10</b>	
		Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness), Disaster Management Act and Policy – Other related policies, plans, programmes and legislation														
<b>UNIT V</b>		<b>DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES</b>													<b>7</b>	
		Landslide Hazard Zonation, Earthquake Vulnerability Assessment of Buildings and Infrastructure, Drought Assessment, Coastal Flooding, Forest Fire, Man Made														

	disasters, Space Based Inputs for Disaster Mitigation and Management, Cast Study				
		<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
		<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>
<b>TEXT BOOKS</b>					
<ol style="list-style-type: none"> <li>1. Singhal J.P. Disaster Management, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423</li> <li>2. Tushar Bhattacharya, Disaster Science and Management, McGraw Hill India Education Pvt. Ltd., 2012. <b>ISBN-10:</b> 1259007367, <b>ISBN-13:</b> 978-1259007361)</li> <li>3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011</li> <li>4. KapurAnu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010</li> </ol>					
<b>REFERENCE BOOKS</b>					
<ol style="list-style-type: none"> <li>1. Siddhartha Gautam and K Leelakrishna Rao, “Disaster Management Programmes and Policies”, Vista International Pub House, 2012</li> <li>2. Arun Kumar, “Global Disaster Management”, SBS Publishers, 2008</li> <li>3. PardeepSahni, AlkaDhameja and Uma medury, “Disaster mitigation: Experiences and reflections”, PHI, 2000</li> <li>4. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005</li> <li>5. Government of India, National Disaster Management Policy, 2009</li> </ol>					
<b>E-REFERENCES</b>					
<ul style="list-style-type: none"> <li>• NIDM Publications at <a href="http://nidm.gov.in">http://nidm.gov.in</a>- Official Website of National Institute of Disaster Management (NIDM), Ministry of Home Affairs, Government of India</li> <li>• <a href="http://cwc.gov.in">http://cwc.gov.in</a> , <a href="http://ekdrm.net">http://ekdrm.net</a> , <a href="http://www.emdat.be">http://www.emdat.be</a> , <a href="http://www.nws.noaa.gov">http://www.nws.noaa.gov</a> , <a href="http://pubs.usgs.gov">http://pubs.usgs.gov</a> , <a href="http://nidm.gov.in">http://nidm.gov.in</a> <a href="http://www.imd.gov.in">http://www.imd.gov.in</a></li> </ul>					

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO 1</b>	1	0	0	1	0	2	2	1	1	0	0	1
<b>CO 2</b>	1	1	2	2	0	1	1	0	1	1	1	1
<b>CO 3</b>	1	1	2	1	3	1	1	0	1	0	1	1
<b>CO 4</b>	1	1	2	2	0	1	1	2	2	2	1	1
<b>CO 5</b>	1	1	0	1	0	1	0	1	1	1	1	1
<b>Total</b>	5	4	6	7	3	6	5	4	6	4	4	5
<b>Scaled Value</b>	1	1	2	2	1	2	1	1	2	1	1	1

<b>Semester</b>		:		<b>IV</b>												
<b>Course Code</b>		:		<b>XCS407</b>												
<b>Course Name</b>		:		<b>IT WORKSHOP</b>												
<b>Prerequisite</b>		:		Working knowledge of some basic application software (Excel). Basic knowledge of computer programming and an understanding of matrix and linear algebra are highly beneficial.												
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>			<b>C</b>	<b>P</b>	<b>A</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>	
	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>			<b>0.4</b>	<b>0.4</b>	<b>0.2</b>			<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	
<b>Course Objectives</b>																
<ul style="list-style-type: none"><li>Understanding the MATLAB environment</li><li>Being able to do simple calculations using MATLAB</li><li>Being able to carry out simple numerical computations and analyses using MATLAB</li></ul>																
<i>Course Outcome: After the completion of the course, students will be able to</i>										<b>Domain or P or A</b>			<b>Level</b>			
<b>CO1</b>	Understand the main features of the MATLAB development environment										Cognitive, Psychomotor Affective			Understand Guided Response Respond		
<b>CO2</b>	Use the MATLAB GUI effectively										Cognitive Psychomotor			Understand Guided Response		
<b>CO3</b>	Design simple algorithms to solve problems										Cognitive Psychomotor Affective			Apply Guided Response Respond		
<b>CO4</b>	Write simple programs in MATLAB to solve scientific and mathematical problems										Cognitive Psychomotor Affective			Apply Guided Response Respond		
<b>CO5</b>	graphical representations and tips for designing and implementing MATLAB code										Cognitive Psychomotor Affective			Apply Guided Response Respond		
<b>COURSE CONTENT</b>																
<b>UNIT I</b>		<b>INTRODUCTION &amp; BASICS</b>													<b>9</b>	
		Why MATLAB? – History - – Familiar with MATLAB windows - Basic Operations - MATLAB-Data types - Rules about variable names - Predefined variables Practical <ol style="list-style-type: none"><li>Basic Operations on Matrices.</li><li>Write a program for Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit impulse, unit step, square, saw tooth, triangular, sinusoidal, ramp, sinc.</li></ol>														
<b>UNIT II</b>		<b>CONDITIONAL STATEMENTS AND LOOPING</b>													<b>9</b>	
		Relational and Logical Operators - If-else statements - Switch-case statements - For loop - While loop - Special commands( Break and continue) - Import data from large database - Export data to own file or database Practical														

	<div>1. Write a program to perform operations like addition, multiplication, scaling, shifting, and folding on signals and sequences and computation of energy and average power.</div> <div>2. Find the roots of the equations <math>6x^5 - 41x^4 + 97x^3 - 97x^2 + 41x - 6</math></div> <div>3. Find the values of <math>x, y, z</math> of the equations <math>x + y + z = 3, x + 2y + 3z = 4, x + 4y + 9z = 6</math></div> <div>4. For <math>f(x) = 8x^8 - 7x^7 + 12x^6 - 5x^5 + 8x^4 + 13x^3 - 12x^2 + 9</math> compute <math>f(2)</math>, roots of <math>f(x)</math> and plot for 0 20</div>									
UNIT III	MATLAB PROGRAMMING I	9								
	<div>Vector – Matrix - Array Addressing - Built-in functions - Mathematical Operations</div> <div>- Script file – Input commands – Output commands – Structure of function file –</div> <div>Inline functions</div> <div>Practical</div> <div>1. Solution of Linear equations for Underdetermined and over determined cases.</div> <div>2. Determination of Eigen values and Eigen vectors of a Square matrix.</div> <div>Solution of Difference Equations.</div> <div>3. Solution of Difference Equations using Euler Method.</div>									
UNIT IV	2D & 3D PLOTTING	9								
	<div>In-built functions for plotting - Multiple plotting with special graphics - Curve fitting – Interpolation - Basic fitting interface - Mesh plot - Surface plot</div> <div>PRACTICAL</div> <div>1. Determination of polynomial fit, analyzing residuals, exponential fit and error bounds from the given data.</div> <div>2. Determination of polynomial using method of Least Square Curve Fitting.</div>									
UNIT V	GRAPHICAL USER INTERFACE	9								
	<div>Creating menu window for providing input - Creating graphical user interface table</div> <div>- Modifying table content - Creating a database</div> <div>Practical</div> <div>1. GRAPHICS - 2D PLOTS</div>									
		<table><tr><td>L</td><td>T</td><td>P</td><td>Total</td></tr><tr><td>45</td><td>0</td><td>0</td><td>45</td></tr></table>	L	T	P	Total	45	0	0	45
L	T	P	Total							
45	0	0	45							
REFERENCE BOOKS										
<div>1. Amos Gilat ‘MATLAB, An Introduction With Applications’, 3<sup>rd</sup> edition, Wiley publishers, 2008</div> <div>2. Stephen J. Chapman’ MATLAB Programming for Engineers’ 5<sup>th</sup> edition, Cengage learninb, 2016</div> <div>3. Holly Moore ‘MATLAB for Engineers’, 5<sup>th</sup> edition, Pearson, 2012</div>										
E-REFERENCES										
<div>1. <a href="https://nptel.ac.in/courses/111/102/111102137/">https://nptel.ac.in/courses/111/102/111102137/</a></div> <div>2. <a href="https://in.mathworks.com/help/matlab/">https://in.mathworks.com/help/matlab/</a></div>										

Mapping of CO with PO's														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	0	0	0	1	3	0	0	0	0	0	0	1	0	0
CO 2	2	2	0	1	3	0	0	0	0	0	0	1	0	0
CO 3	0	2	1	2	2	0	0	0	0	0	0	1	0	0
CO 4	0	0	0	0	2	0	0	0	0	0	0	0	0	0
CO 5	0	0	0	2	2	0	0	0	0	0	0	0	0	0
Total	2	4	1	6	12	0	0	0	0	0	0	3	0	0
Scaled Value	1	1	1	2	3	0	0	0	0	0	0	1	0	0
Note:	Total		0	1-5		6-10		11-15						
	Scaled value		0	1		2		3						
	Relation		No	Low		Medium		High						

<b>COURSE CODE</b>	<b>XCS408</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>OPERATING SYSTEMS LABORATORY</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>PREREQUISITES</b>	<b>PROGRAMMING FOR PROBLEM SOLVING, DATA STRUCTURES AND ALGORITHMS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>	<b>0.8:0.2:0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>COURSE OBJECTIVES</b> <ul style="list-style-type: none"> <li>To make aware of different types of Operating System and their services.</li> <li>To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.</li> <li>To know memory management concepts.</li> <li>To learn implementation of file system.</li> </ul>					
<b>COURSE OUTCOMES</b>		<b>DOMAIN</b>		<b>LEVEL</b>	
<b>CO1</b>	<i>Experiment with</i> UNIX Commands	Cognitive		Apply	
<b>CO2</b>	<i>Solve</i> various CPU scheduling algorithms.	Cognitive		Apply	
<b>CO3</b>	<i>Demonstrate</i> the process synchronization and deadlocks.	Cognitive		Understand	
<b>CO4</b>	<i>Demonstrate</i> the memory management strategies.	Cognitive Psychomotor		Understand Guided Response	
<b>CO5</b>	<i>Demonstrate</i> File Organization and File Allocation Strategies.	Cognitive Psychomotor		Understand Guided Response	

<b>S.No</b>	<b>List of Experiments</b>	<b>COs</b>			
1	Basics of UNIX commands	CO1			
2	Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, opendir, readdir.	CO1			
3	Write C programs to simulate UNIX commands like cp, ls, grep.	CO1			
4	Implement the various CPU scheduling algorithms like FCFS, SJF scheduling, Priority and Round robin scheduling.	CO2			
5	Implement Producer – Consumer Problem.	CO3			
6	Implementation of Banker's Algorithm.	CO3			
7	Implementation of the Memory Allocation Methods.	CO4			
8	Implementation of the Page Replacement Algorithms.	CO4			
9	File Organization Techniques.	CO5			
10	File Allocation Strategies.	CO5			
<b>HOURS</b>		<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>	
		<b>0</b>	<b>30</b>	<b>30</b>	

Mapping of CO with PO's														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	1	1	0	0	0	0	1	0	0	0	3	2
CO 2	3	2	1	1	1	0	0	0	1	0	0	0	3	2
CO 3	2	1	0	0	1	0	0	0	1	0	0	0	3	2
CO 4	2	1	0	0	1	0	0	0	1	0	0	0	3	2
CO 5	2	1	0	0	1	0	0	0	1	0	0	0	3	2
Total	12	7	2	2	4	0	0	0	5	0	0	0	15	10
Scaled Value	3	2	1	1	1	0	0	0	1	0	0	0	3	2
Note:														
	Total	0		1-5		6-10		11-15						
	Scaled value	0		1		2		3						
	Relation	No		Low		Medium		High						

COURSE CODE				XCS409									
COURSE NAME				DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY									
PREREQUISITES				PROBLEM SOLVING USING C, DATA STRUCTURES									
L	T	P	C		C	P	A			L	T	P	H
0	0	1	1		0.5	0.5	0			0	0	2	2

### COURSE OBJECTIVES

The course should enable the students to:

- Learn how to analyze a problem and design the solution for the problem.
- Design and implement efficient algorithms for a specified application.
- Strengthen the ability to identify and apply the suitable algorithm for the given real world problem.

<b>COURSE OUTCOMES:</b> <i>After the completion of the course, the students will be able to</i>				<b>DOMAIN</b>	<b>LEVEL</b>
<b>CO1</b>	<i>Analyze</i> the time complexities of recursive and non-recursive algorithms.			Cognitive Psychomotor	Analyze Guided Response
<b>CO2</b>	<i>Solve</i> the problems using divide and conquer approach.			Cognitive Psychomotor	Apply Guided Response
<b>CO3</b>	<i>Solve</i> the problems using dynamic programming approach.			Cognitive Psychomotor	Apply Guided Response
<b>CO4</b>	Solve the problems using backtracking method.			Cognitive Psychomotor	Apply Guided Response
<b>CO5</b>	Solve a problem using approximation algorithm.			Cognitive Psychomotor	Apply Guided Response

<b>S.No.</b>	<b>List of Exercises</b>	<b>COs</b>
1	i. Implementation of the complexity of non-recursive algorithm for finding a factorial of a number. ii. Implementation of the complexity of non-recursive algorithm for bubble sorting technique. iii. Implementation of the complexity of finding a factorial value using recursive algorithm iv. Implementation of Towers of Hanoi puzzle using recursive algorithm and display its complexities.	CO1
2	i. Implementation of Prim's algorithm for finding a minimum spanning tree using divide and conquer approach. ii. Implementation of Kruskal's algorithm for finding the Minimum Spanning	CO2

	Tree of a given undirected graph.			
iii.	Implementation of Dijkstra's algorithm for finding the shortest paths to other vertices from a given vertex in a weighted connected graph.			
3	<div><div>i.</div><div>ii.</div><div>iii.</div></div> Implementation of Warshall's algorithm to compute the transitive closure of a given directed graph. Implementation of Floyd's algorithm to find all-pairs shortest paths for the given directed weighted graph. Implementation of 0/1 Knapsack problem using dynamic programming approach.	CO3		
4	<div><div>i.</div><div>ii.</div><div>iii.</div><div>iv.</div></div> Implementation of N Queen's problem using backtracking approach. Implementation of the Hamiltonian Cycle problem using backtracking approach. Implementation of the sum subset problem using backtracking approach. Implementation of job assignment problem using branch and bound approach.	CO4		
5	<div><div>i.</div></div> Implementing travelling salesman problem for finding the minimum tour cost.	CO5		
HOURS		TUTORIAL	PRACTICAL	TOTAL
		0	30	30

Mapping of CO with PO's														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	2	1	0	0	0	0	0	0	0	0	1	1
CO 2	2	3	2	2	0	0	0	0	0	0	0	0	1	1
CO 3	2	3	2	0	0	0	0	0	0	0	0	0	1	1
CO 4	2	3	2	2	0	0	0	0	1	0	0	0	1	1
CO 5	2	2	2	2	0	0	0	0	1	0	1	0	1	1
<b>Total</b>	10	12	10	7	0	0	0	0	2	0	1	0	5	5
<b>Scaled Value</b>	2	3	2	2	0	0	0	0	1	0	1	0	1	1
<b>Note:</b>	<b>Total</b>	0		1-5		6-10		11-15						
	<b>Scaled value</b>	0		1		2		3						
	<b>Relation</b>	No		Low		Medium		High						

## SEMESTER - V

SEMESTER					:	V								
COURSE CODE					:	XCS501								
COURSE NAME					:	FORMAL LANGUAGE AND AUTOMATA THOERY								
PREREQUISITE					:	DATA STRUCTURES AND ALGORITHMS								
	L	T	P	C		C	P	A		L	T	P	H	
	3	0	0	3		3	0	0		3	0	0	3	
Course Outcome: After the completion of the course, students will be able to									Domain C or P or A		Level			
COURSE OUTCOMES														
CO1	Understand the fundamental of the basic kinds of finite automata and their capabilities								Cognitive		Understand			
CO2	Categorize regular and context-free languages								Cognitive		Understand			
CO3	Interpret transform regular expressions to grammars								Cognitive		Understand			
CO4	Construct of Turing Machines								Cognitive		Understand			
CO5	Identify the key results in algorithmic and computational complexity.								Cognitive		Understand			
UNIT I FINITE AUTOMATA												9		
Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with $\epsilon$ -moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA’s with and without $\epsilon$ -moves – Equivalence of finite Automaton and regular expressions –Minimization of DFA- - Pumping Lemma for Regular sets – Problems based on Pumping Lemma.														
UNIT II GRAMMARS												9		
Grammar Introduction– Types of Grammar - Context Free Grammars and Languages– Derivations and Languages – Ambiguity- Relationship between derivation and derivation trees – Simplification of CFG – Elimination of Useless symbols - Unit productions - Null productions – Greiback Normal form – Chomsky normal form – Problems related to CNF and GNF.														
UNIT III PUSHDOWN AUTOMATA												9		
Pushdown Automata- Definitions – Moves – Instantaneous descriptions –Deterministic pushdown automata – Equivalence of Pushdown automata and CFL - pumping lemma for CFL – problems based on pumping Lemma.														
UNIT IV TURING MACHINE												9		
Turing Machines- Introduction – Formal definition of Turing machines –Instantaneous descriptions- Turing Machine as Acceptors – Turing Machine as Transducers Computable Languages and functions – Turing Machine constructions – Modifications of Turing Machines.														
UNIT V COMPUTATIONAL COMPLEXITY												9		
Undesirability- Basic definitions- Decidable and undecidable problems - Properties of Recursive and Recursively enumerable languages – Introduction to Computational Complexity: Definitions-Time and Space complexity of TMs –complexity classes – introduction to NP-Hardness and NP-Completeness.														

	LECTURE	TUTORIAL	TOTAL
	45	0	45
<b>TEXT BOOKS</b>			
1. Peter Linz An Introduction to Formal Languages and Automata 6 <sup>th</sup> edition, Jones & Bartlett, 2016 2. Hopcroft J.E., Motwani R. and Ullman J.D, “Introduction to Automata Theory, Languages and Computations”, Third Edition, Pearson Education, 2008.ISBN-13: 978-8131720479			
<b>REFERENCES</b>			
1. John.C.Martin, “Introduction to Languages and the Theory of Computation” McGraw-Hill Education, 01-May-2010. 2. Michael Sipser, “Introduction to the Theory of Computation” Cengage Learning, 2012.			
<b>E-REFERENCES</b>			
1. Theory of Computation by Prof.Somenath Biswas, Computer Science and Engineering, IIT Kanpur 2. Swayam - Theory of Computation: <a href="https://onlinecourses.nptel.ac.in/noc19_cs79/preview#:~:text=PRE%20DREQUISITES%3A%20It%20is%20recommended,in%20Data%20Structures%20and%20Algorithms.&amp;text=Category%20%3A,Computer%20Science%20and%20Engineering">https://onlinecourses.nptel.ac.in/noc19_cs79/preview#:~:text=PRE%20DREQUISITES%3A%20It%20is%20recommended,in%20Data%20Structures%20and%20Algorithms.&amp;text=Category%20%3A,Computer%20Science%20and%20Engineering</a>			

### Mapping of COs with POs:

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

<b>Note:</b>	<b>Total</b>	0	1-5	6-10	11-15				
	<b>Scaled value</b>	0	1	2	3				
	<b>Relation</b>	No	Low	Medium	High				

SEMESTER					:	V											
COURSE CODE					:	XCS502											
COURSE NAME					:	DATABASE MANAGEMENT SYSTEMS											
PREREQUISITE					:	DATA STRUCTURES AND ALGORITHMS											
	L	T	P	C			C	P	A			L	T	P	H		
	3	0	0	3			3	0	0			3	0	0	3		
Course Objectives																	
• To learn the fundamentals of data models and to represent a database system using Entity Relationship diagrams																	
• To learn SQL and relational database design																	
• To understand the internal storage structures using different file and indexing techniques																	
• To understand the fundamental concepts of transaction processing, concurrency control techniques and recovery procedures																	
Course Outcome: After the completion of the course, students will be able to											Domain		Level				
CO1	Relate and Apply the design principles for logical design of databases, including Entity Relationship model.										Cognitive		Apply				
CO2	Build queries with the basics of Structured Query Language and relational algebra.										Cognitive		Apply				
CO3	Explain the basic database storage structures and access techniques: file organizations, indexing methods including B-tree, B+ tree and hashing.										Cognitive		Understand				
CO4	Explain the basic issues of transaction processing concurrency control and recovery procedure.										Cognitive		Understand				
CO5	Develop a real database application with the advanced concepts.										Cognitive		Apply				
COURSE CONTENT																	
UNIT I		INTRODUCTION													9		
		Introduction to File and Database systems- Database system structure – Data Models – Types of Data models – ER model – Relational Model – Keys – Relational Algebra and Calculus.															
UNIT II		RELATIONAL MODEL													9		
		SQL – Data definition- Queries in SQL- Updates- Views – Integrity and Security – Relational Database design – Functional dependencies and Normalization for Relational Databases – Decomposition - Desirable Properties of Decomposition - Boyce-Codd Normal Form.															
UNIT III		DATA STORAGE AND QUERY PROCESSING													9		
		Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary storage – File Organization –Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing– Query Processing.															
UNIT IV		TRANSACTION MANAGEMENT													9		
		Transaction Processing – Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules – Concurrency Control – Types of Locks- Two Phases locking-															

	Deadlock- Time stamp based concurrency control – Recovery Techniques – Immediate Update- Deferred Update - Shadow Paging.													
UNIT V	ADVANCED DATABASES												9	
	Distributed databases - Homogenous and Heterogeneous - Distributed data Storage Object Oriented Databases - Need for Complex Data types - OO data Model- Nested relations - Complex Types - Inheritance Reference Types - XML - Structure of XML Data - XML Document Schema - Querying and Transformation - Data Mining and Data Warehousing -Web database-Spatial database -Temporal database - Multimedia database.													
									L	T	P	Total		
									45	0	0	45		
TEXT BOOKS														
1. Abraham Silberschatz, Henry F. Korth and S. Sudharshan, “Database System Concepts”, Seventh Edition, Tata Mc Graw Hill, 2021.														
REFERENCE BOOKS														
1. Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education, 2008.														
2. Raghurama Krishnan, Johannes Gehrke, “Database Management Systems”, 3rd edition, Tata McGraw Hill, 2002.														
E-REFERENCES														
1. <a href="https://onlinecourses.nptel.ac.in/noc22_cs91/preview">https://onlinecourses.nptel.ac.in/noc22_cs91/preview</a>														
2. <a href="http://spoken-tutorial.org">http://spoken-tutorial.org</a>														
3. <a href="http://vlab.co.in/">http://vlab.co.in/</a>														
Mapping of CO with PO’s														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	1	1	1	0	0	0	0	0	0	0	3	2
CO 2	3	2	1	1	1	0	0	0	0	0	0	0	3	2
CO 3	2	1	0	0	1	0	0	0	0	0	0	0	3	2
CO 4	2	1	0	0	1	0	0	0	0	0	0	0	3	2
CO 5	3	2	1	1	1	0	0	0	0	0	0	0	3	2
Total	13	8	3	3	5	0	0	0	0	0	0	0	15	10
Scaled Value	3	2	1	1	1	0	0	0	0	0	0	0	3	2
Note:	Total			0	1-5	6-10	11-15							
	Scaled value			0	1	2	3							
	Relation			No	Low	Medium	High							

<b>SEMESTER</b>		:	<b>V</b>													
<b>COURSE CODE</b>		:	<b>XCS503</b>													
<b>COURSE NAME</b>		:	<b>SOFTWARE ENGINEERING</b>													
<b>PREREQUISITE</b>		:	<b>-</b>													
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>			<b>C</b>	<b>P</b>	<b>A</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>	
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>			<b>3</b>	<b>0</b>	<b>0</b>			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>Course Objectives</b>																
<ul style="list-style-type: none"><li>• To impart knowledge on the basic principles of software development life cycle.</li><li>• To familiarize with the importance of the software design concepts</li><li>• To develop correct and software quality assurance products.</li><li>• To understand the concept software project management.</li><li>• To understand the various software development and testing tools.</li></ul>																
<i>Course Outcome: After the completion of the course, students will be able to</i>											<b>Domain C or P or A</b>			<b>Level</b>		
<b>CO1</b>	<i>Describe</i> the software development activities and various software development process models.										Cognitive			Understand		
<b>CO2</b>	<i>Apply</i> the knowledge of design concepts to various applications.										Cognitive			Apply		
<b>CO3</b>	<i>Apply</i> various software testing techniques to an application.										Cognitive			Apply		
<b>CO4</b>	<i>Determine</i> the project cost by various estimation techniques										Cognitive			Apply		
<b>CO5</b>	<i>Describe</i> the advanced software engineering concepts and the development tools										Cognitive			Understand		
<b>COURSE CONTENTS</b>																
<b>UNIT I</b>		<b>SOFTWARE PROCESS AND REQUIREMENTS</b>													<b>9</b>	
		Introduction – Hardware Vs. Software - A Generic view of Process – SDLC - Process life cycle models (Water Fall, Incremental, Evolutionary, Specialized, Agile) – Agile development - System Engineering. Requirements Engineering - Requirement gathering techniques - Requirements Engineering tasks – Process - Requirement Analysis - Eliciting Requirements - Building the analysis Model.														
<b>UNIT II</b>		<b>DESIGN CONCEPTS AND PRINCIPLES</b>													<b>9</b>	
		Design Engineering – Design Process and Design Concepts and Model-Architectural design - software architecture – data design – architectural design – transform and transaction mapping- Modeling the Component Level Design - User interface analysis and design - Coupling and Cohesion- Design elements of interface, component level and deployment level.														
<b>UNIT III</b>		<b>TESTING</b>													<b>9</b>	
		Testing Strategies - A strategic approach to software testing - Strategic Issues - Test strategy for Conventional software, Object oriented software – SQA - Validation Testing - System testing and debugging - Testing fundamentals - Black Box testing - White Box testing - Basis Path testing - control structure testing - Test case - Performance testing - Object oriented testing.														
<b>UNIT IV</b>		<b>SOFTWARE PROJECT MANAGEMENT</b>													<b>9</b>	
		Project Management life cycle – Need of application maintenance – Management spectrum - Testing Rationale Management – Configuration Management – Project Management – project process product measures and metrics – Estimation of														

	software projects – Decomposition techniques and empirical estimation models - Risk analysis and mitigation plans - Procurement management.													
UNIT V	ADVANCED TOPICS IN SOFTWARE ENGINEERING												9	
	Formal Methods – Basic Concepts – Mathematical preliminaries-Applying Mathematical notations for formal specification – Formal specification languages-Clean room software Engineering-Clean room Approach- Reengineering-Software Reengineering-Reverse Engineering- Forward Engineering- Introduction to CASE tools and testing tools – Software process improvement –Automation testing tools.													
										L	T	P	Total	
										45	0	0	45	
TEXT BOOKS														
1. Ian Sommerville, “Software engineering”, Pearson Education Asia, 10 <sup>th</sup> Edition, 2016. 2. Roger S.Pressman, Software engineering- A practitioner’s Approach, McGraw- Hill International Edition, 8 <sup>th</sup> edition, 2015														
REFERENCE BOOKS														
1. PankajJalote- An Integrated Approach to Software Engineering, 3 <sup>rd</sup> Edition 2011. 2. C.RavindranathPandian, “Software Metrics – A guide to planning, analysis and application”, AuerbachPublication, Newyork 2011. 3. Ali Behforooz, Frederick J Hudson, “Software Engineering Fundamentals”, 2 <sup>nd</sup> Edition, Oxford University Press, Noida, 2009.														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS01	PS02
CO 1	1	2	1	0	2	1	0	0	0	0	0	2	2	1
CO 2	2	3	3	2	2	1	3	0	0	0	0	1	2	2
CO 3	3	3	3	1	1	3	0	1	2	0	3	3	2	2
CO 4	3	3	3	1	1	3	0	1	2	0	3	3	2	2
CO 5	1	3	0	0	3	0	1	0	0	1	0	1	2	1
Total	10	14	10	4	9	8	4	2	4	1	6	10	10	8
Scaled Value	2	3	2	1	2	2	1	1	1	1	2	2	2	2
Note:														
	Total			0	1-5	6-10	11-15							
	Scaled value			0	1	2	3							
	Relation			No	Low	Medium	High							

SEMESTER					:	V										
COURSE CODE					:	XCS504										
COURSE NAME					:	COMPUTER NETWORKS										
PREREQUISITE					:	PROGRAMMING FOR PROBLEM SOLVING AND DATA STRUCTURES										
	L	T	P	C			C	P	A			L	T	P	H	
	3	1	0	4			3	0	0			3	1	0	4	
Course Objectives																
<ul style="list-style-type: none"><li>To make students understand the basic structure and various principles computer networking.</li><li>To familiarize with the concepts of error detection and correction techniques.</li><li>To study the functions of switching and routing.</li><li>To study the functions of multiplexing and demultiplexing in transport layer.</li><li>To understand the various principles, protocols and design aspects of computer networking.</li></ul>																
Course Outcome: After the completion of the course, students will be able to											Domain			Level		
CO1	Understand the networks components and the various network components										Cognitive			Understand		
CO2	Describe and Recognize the network error detection and correction methods.										Cognitive			Understand		
CO3	Identify and interpret the network switching and addressing methods and apply the various routing simulations.										Cognitive			Apply		
CO4	Understand the transport layer functions and setup connection oriented protocol.										Cognitive			Understand		
CO5	Describe the Application layer functions and network security.										Cognitive			Understand		
COURSE CONTENT																
UNIT I		DATA COMMUNICATIONS													9	
		Network Components- Direction of Data flow-networks- Components and Categories – types of connections- Topologies- Protocols and Standards – ISO/OSI model – Transmission Media –Coaxial Cable – Fiber Optics – Line Coding – Modems														
UNIT II		DATA LINK LAYER													9	
		Error – Detection and Correction – Parity – LRC - CRC – Hamming code – low Control and Error control – stop and wait – go back –N ARQ – selective repeat ARQ – Sliding window – HDLC – LAN – Ethernet IEEE 802.3 - IEEE 802.5 - IEEE 802.11 – FDDI – SONET – Bridges.														
UNIT III		NETWORK LAYER													9	
		Internetworks – Packet switching and Datagram approach – IP addressing methods – subnetting – Routing – Distance Vector Routing – Link State Routing – Routers														

UNIT IV	TRANSPORT LAYER												9	
	Duties of Transport Layer – Multiplexing – De multiplexing – Sockets – User Datagram Protocol(UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of Service (QOS) – Integrated Services.													
UNIT V	APPLICATION LAYER												9	
	Domain Name Space (DNS) – SMTP – POP 3 – FTP – HTTP – WWW-Security - Cryptography ,Case study on TCP/IP Architecture.													
									L	T	P	Total		
									45	0	0	45		
TEXT/ REFERENCE BOOKS														
1. Behrouz A Forouzan “Data Communications Networking” 5 <sup>h</sup> Edition Tata McGraw Hill, 2017.														
2. Andrew S. Tanenbaum, David J. Wetherall, “Computer Networks”, 5th Edition, 2013														
3. W. Stallings, "Data and Computer Communication", 10 <sup>th</sup> edition, Pearson Education, 2017.														
4. Larry L. Peterson and Peter S.Davie, “Computer Networks”, Morgan Kauffman Publishers 5th Edition 2011.														
E REFERENCES														
1. <a href="http://nptel.ac.in/courses/106105081/">http://nptel.ac.in/courses/106105081/</a>														
2. NPTEL videos Computer Networks by Prof. Sujoy Ghosh Department of Computer Science & Engineering Indian Institute of Technology, Kharagpur.														
Mapping of CO with PO’s														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	2	1	1	1	0	0	0	0	1	0	1	1	3	2
CO 2	3	2	2	1	0	0	0	0	1	0	1	0	3	2
CO 3	3	2	3	1	0	0	0	0	1	0	1	0	3	2
CO 4	2	1	2	1	0	0	0	0	0	0	1	0	3	2
CO 5	2	1	1	1	2	0	0	0	0	0	1	1	3	2
Total	12	7	9	5	2	0	0	0	3	0	5	2	15	10
Scaled Value	3	2	2	1	1	0	0	0	1	0	1	1	3	2
Note:														
	Total	0		1-5		6-10		11-15						
	Scaled value	0		1		2		3						
	Relation	No		Low		Medium		High						

<b>COURSE CODE</b>	<b>XCS507</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>DATABASE MANAGEMENT SYSTEMS LABORATORY</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>	<b>0.7:0.3:0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>

#### **COURSE OBJECTIVES**

- To facilitate students in database design using Entity Relationship data model.
- To learn the basics of SQL and construct queries using SQL.
- To develop solutions using database concepts for real time applications.

<b>COURSE OUTCOMES</b>		<b>DOMAIN</b>	<b>LEVEL</b>
<b>CO1</b>	<i>Apply</i> the design principles for logical design of databases, including ER model and normalization approach.	Cognitive Psychomotor	Apply Guided Response
<b>CO2</b>	<i>Construct</i> queries with the basics of SQL.	Cognitive Psychomotor	Apply Guided Response
<b>CO3</b>	<i>Construct</i> database applications using high level language extensions with cursors and triggers	Cognitive	Apply Guided Response
<b>CO4</b>	<i>Demonstrate</i> the programs PL/SQL using stored procedures and functions.	Cognitive	Understand Guided Response
<b>CO5</b>	Work successfully in a team to design and <i>develop</i> the database applications.	Cognitive Psychomotor	Apply Guided Response

<b>S.No</b>	<b>List of Experiments</b>	<b>COs</b>		
1	Database design using E-R model and Normalization	CO1		
2	Data Definition Language (DDL) commands in RDBMS	CO2		
3	Data Manipulation Language (DML) and Data Control Language (DCL)	CO2		
4	Views	CO2		
5	High level language extensions with cursors and Triggers	CO3		
6	Procedures and Functions	CO4		
7	Design and implementation of payroll processing system	CO5		
8	Design and implementation of Banking system	CO5		
9	Design and implementation of Library Information System	CO5		
10	Design and implementation of Student Information System	CO5		
<b>HOURS</b>		<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>
		<b>0</b>	<b>30</b>	<b>30</b>

Mapping of CO with PO's														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS01	PS02
CO 1	3	2	1	1	1	0	0	0	1	0	0	0	3	2
CO 2	3	2	1	1	1	0	0	0	1	0	0	0	3	2
CO 3	3	2	1	1	1	0	0	0	1	0	0	0	3	1
CO 4	2	1	0	0	1	0	0	0	1	0	0	0	3	1
CO 5	3	2	1	1	1	0	0	0	1	0	0	0	3	3
Total	14	9	4	4	5	0	0	0	5	0	0	0	15	9
Scaled Value	3	2	1	1	1	0	0	0	1	0	0	0	3	2
Note:	Total		0		1-5		6-10		11-15					
	Scaled value		0		1		2		3					
	Relation		No		Low		Medium		High					

<b>COURSE CODE</b>	<b>XCS508</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>SOFTWARE ENGINEERING LABORATORY</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>PREREQUISITES</b>	<b>PROGRAMMING FOR PROBLEM SOLVING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>	<b>0.5:0.5:0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>

#### LEARNING OBJECTIVES

- Ability to translate end-user requirements into system and software requirements.
- Create traceability matrix and design SRS document
- Ability to generate a high-level design of the system from the software requirements.
- Ability to translate and implement of high level design into software product.
- Students to get experience and/or awareness of testing problems and will be able to develop a simple testing report.

<b>COURSE OUTCOMES</b>		<b>DOMAIN</b>	<b>LEVEL</b>
<i>The students are able to</i>			
<b>CO1</b>	<i>Exercise</i> the preparation of Software Requirements Specification with reference to standard IEEE format.	Cognitive Psychomotor	Apply Guided Response
<b>CO2</b>	<i>Draw</i> the UML static and behaviour diagrams.	Cognitive Psychomotor	Apply Guided Response
<b>CO3</b>	<i>Derive</i> the test cases for white box and black box testing techniques.	Cognitive Psychomotor	Apply Guided Response
<b>CO4</b>	Estimate the project cost using estimation techniques.	Cognitive Psychomotor	Apply Guided Response
<b>CO5</b>	<i>Demonstrate</i> the forward and reverse engineering tasks.	Cognitive Psychomotor	Apply Guided Response

<b>S.No.</b>	<b>List of Exercises</b>	<b>COs</b>
1	For any given case/ problem statement do the following; i. Prepare a SRS document in line with the IEEE recommended standards. ii. Develop Software Requirements Specification (SRS) for a given problem in IEEE template.	CO1
2	i. Draw the use case diagram and specify the role of each of the actors. ii. Draw Class Diagram with the identified class along with its relationships. iii. Draw the sequence diagram. iv. Draw the collaboration diagram v. Draw the activity diagram. vi. Draw the state chart diagram. vii. Draw the component and deployment diagrams.	CO2
3	i. Prototype model –Develop the prototype of the product. ii. Develop test cases for various white box and black box testing techniques. iii. Develop test cases for unit testing and integration testing.	CO3
4	i. Estimate the Project cost using COCOMO model.	CO4

	ii.	Prepare Project Management Document for any one of the project.		
5	i.	Perform forward engineering for any one module of a project (Model to code conversion).	CO5	
	ii.	Perform reverse engineering for any one module of a project (Code to Model conversion).		
HOURS		TUTORIAL	PRACTICAL	TOTAL
		0	30	30

Mapping of CO with PO's														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	2	1	0	1	0	0	0	2	2	1	1	1	2
CO 2	2	2	3	0	2	0	0	0	2	2	1	2	1	1
CO 3	2	2	3	0	2	0	0	0	1	1	2	2	1	1
CO 4	2	2	0	0	0	0	0	0	1	0	1	0	1	1
CO 5	2	2	0	0	0	0	0	0	1	0	0	0	1	1
Total	10	10	7	0	5	0	0	0	7	5	5	5	5	6
Scaled Value	2	2	2	0	1	0	0	0	2	1	1	1	1	2
Note:	Total	0	1-5	6-10	11-15									
	Scaled value	0	1	2	3									
	Relation	No	Low	Medium	High									

<b>COURSE CODE</b>	<b>XCS509</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>IN-PLANT TRAINING – II</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>C:P:A</b>	<b>0.5:0.5:0</b>				
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<b>COURSE OUTCOMES</b>		<b>Domain</b>	<b>Level</b>
<b>CO1</b>	<i>Relate</i> classroom theory with workplace practice	Cognitive	Understand
<b>CO2</b>	<i>Comply with</i> Factory discipline, management, and business practices.	Psychomotor	Guided Response
<b>CO3</b>	<i>Demonstrates</i> teamwork and time management.	Psychomotor	Guided Response
<b>CO4</b>	<i>Describe</i> and <i>display</i> hands-on experience on practical skills obtained during the programme.	Psychomotor	Perception
<b>CO5</b>	<i>Summarize</i> the tasks and activities done by technical documents and oral presentations	Psychomotor	Guided Response

### CO Vs PO Mapping

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>
<b>CO1</b>	2	0	0	0	0	0	0	0	0	0	0	0
<b>CO2</b>	0	0	0	0	0	0	1	3	0	0	1	0
<b>CO3</b>	0	0	0	0	0	0	0	0	3	1	3	1
<b>CO4</b>	0	1	2	1	3	0	0	0	0	0	0	3
<b>CO5</b>	0	0	0	3	0	0	0	0	0	3	0	1
<b>Total</b>	2	1	2	4	3	0	1	3	3	4	4	5
<b>Scaled</b>	1	1	1	1	1	0	1	1	1	1	1	1

## SEMESTER- VI

SEMESTER					:	VI											
COURSE CODE					:	XCS601											
COURSE NAME					:	COMPILER DESIGN											
PREREQUISITE					:	FORMAL LANGUAGE AND AUTOMATA THEORY											
	L	T	P	C			C	P	A			L	T	P	H		
	3	0	0	3			3	0	0			3	0	0	3		
Course Objectives																	
• Learn to understand the internals of Compiler Design.																	
• Learn the process of translating a modern high-level language to executable code.																	
• Learn to apply the optimization techniques for better code.																	
Course Outcome: After the completion of the course, students will be able to										Domain C or P or A			Level				
CO1	Describe the compilers and its construction tools and specification of tokens.										Cognitive			Understand			
CO2	Describe the various parsing techniques for parsing the string.										Cognitive			Understand			
CO3	Illustrate the intermediate language.										Cognitive			Understand			
CO4	Describe the code generation to generate target code.										Cognitive			Understand			
CO5	Explain the optimization techniques										Cognitive			Understand			
COURSE CONTENT																	
UNIT I		INTRODUCTION TO COMPILING													9		
		Compilers – analysis of the source program – phases of a compiler – cousins of the compiler – grouping of phases – compiler construction tools – lexical analysis – role of lexical analyzer – input buffering – specification of tokens-Lex- Simple Program using Lex.															
UNIT II		SYNTAX ANALYSIS													9		
		Role of the parser –Writing Grammars –Context-Free Grammars – Top Down parsing – Recursive Descent Parsing – Predictive Parsing – Bottom-up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser-YACC –Simple Program using YACC.															
UNIT III		INTERMEDIATE CODE GENERATION													9		
		Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.															
UNIT IV		CODE GENERATION													9		
		Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next-use Information – A simple Code generator – DAG representation of Basic Blocks – Peephole Optimization.															
UNIT V		CODE OPTIMIZATION AND RUN TIME ENVIRONMENTS													9		

	Introduction– Principal Sources of Optimization – Optimization of basic Blocks – Introduction to Global Data Flow Analysis – Runtime Environments – Source Language issues – Storage Organization – Storage Allocation strategies – Access to non-local names – Parameter Passing.				
		<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
		<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>

### TEXT BOOKS

1. Godfrey Winster, Aruna Devi , Sujatha “Compiler Design” Second Edition Paperback, Yes Dee Publishing, 2020 ISBN 10: 9388005201/ ISBN-13: 978-9388005203
2. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, "Compilers- Principles, Techniques, and Tools (Second Edition)", Reprint ISBN 10: 8131721019 / ISBN 13: 9788131721018, Pearson Education India, 2012.

### REFERENCE BOOKS

1. Torben Ægidius Mogensen , Introduction to Compiler Design, Springer International Publishing, 2017, 2<sup>nd</sup> edition , ISBN: 3319669656, 9783319669656.
2. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques, and Tools Pearson New International Edition 2nd Edition, ISBN-10-1292024348, ISBN-13:978-1292024349, 2<sup>nd</sup> edition, Pearson Education India, 2013.
3. Allen I. Holub “Compiler Design in C”, Prentice Hall of India, 2003.
4. C. N. Fischer and R. J. LeBlanc, “Crafting a compiler with C”, Benjamin Cummings, 2003.

### E-REFERENCES

1. <http://nptel.ac.in/downloads/106108113/>
2. <http://www.svecw.edu.in/Docs%5CCSECDLNotes2013.pdf>
3. <https://www.wiziq.com/tests/compiler-design>
4. <http://spoken-tutorial.org/>
5. <http://vlab.co.in/>

### Mapping of CO with PO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO 1</b>	1	1	0	1	1	1	0	0	1	1	0	2	3	2
<b>CO 2</b>	1	1	0	1	2	1	0	0	0	0	0	1	2	2
<b>CO 3</b>	1	2	2	2	1	1	1	0	1	0	0	1	1	1
<b>CO 4</b>	2	2	2	2	2	1	0	0	1	1	0	1	2	2
<b>CO 5</b>	2	3	3	2	3	1	0	0	1	1	0	1	3	2
<b>Total</b>	7	9	7	8	9	5	1	0	4	3	0	6	11	9
<b>Scaled Value</b>	2	2	2	2	2	1	1	0	1	1	0	2	3	2

<b>Note:</b>	<b>Total</b>	0	1-5	6-10	11-15				
	<b>Scaled value</b>	0	1	2	3				
	<b>Relation</b>	No	Low	Medium	High				

Semester		:	VI													
Course Code		:	XCS602													
Course Name		:	Big Data Analytics													
Prerequisite		:	-													
	L	T	P	C			C	P	A			L	T	P	H	
	3	0	0	3			3	0	0			3	0	0	3	
Course Objectives																
• To learn and expose the basics of Big Data and Big Data tools and its analysis techniques																
• To learn and familiar with data streams, classification and clustering																
• To learn and familiar with the frameworks and visualization																
Course Outcome: After the completion of the course, students will be able to											Domain C or P or A		Level			
CO1	Understand and acquire the basic idea of Big Data with Big Data tools and its analysis techniques										Cognitive		Understand			
CO2	Analyze data by utilizing clustering and classification algorithms										Cognitive		Apply			
CO3	Apply different mining algorithms and recommendation systems for large volumes of data										Cognitive		Apply			
CO4	Describe stream computing in Big Data Analytics										Cognitive		Understand			
CO5	Interpret Big Data Framework and Applications										Cognitive		Understand			
COURSE CONTENT																
UNIT I		INTRODUCTION TO BIG DATA														9
		Evolution of Big Data - Best Practices for Big Data Analytics - Big Data characteristics – Validating –The promotion of the value of Big Data – Big Data Use Cases – Characteristics of Big Data Applications – Perception and Quantification of value – Understanding Big Data storage – A General Overview of High-Performance Architecture – HDFS – Map Reduce and YARN – Map Reduce Programming Model.														
UNIT II		CLUSTERING AND CLASSIFICATION														9
		Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree -Naïve Bayes - Bayes‘ Theorem -Naïve Bayes Classifier.														
UNIT III		ASSOCIATION AND RECOMMENDATION SYSTEM														9
		Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association & finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation Approaches.														
UNIT IV		MINING DATA STREAMS														9
		Introduction to Streams Concepts – Stream data model and architecture - Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window – Real time Analytics Platform(RTAP) applications - case studies - real time sentiment analysis, stock market predictions.														
UNIT V		FRAMEWORKS AND VISUALIZATION														9
		MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis														

	techniques, interaction techniques; Systems and applications:													
									L	T	P	Total		
									45	0	0	45		
TEXT BOOKS														
1. Subhashini Chellappan Seema Acharya, “Big Data and Analytics”, Wiley publication,ISBN 10: 812657951X, ISBN 13: 978-8126579518,2019.														
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools,Techniques, NoSQL, and Graph", Morgan Kaufmann/Elsevier Publishers, 2013.														
3. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.														
REFERENCE BOOKS														
1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.														
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.														
3. Dietmar Jannach and Markus Zanker, "Recommender Systems: An Introduction", Cambridge University Press, 2010.														
4. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.														
5. Jimmy Lin and Chris Dyer, "Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers, 2010.														
E-REFERENCES														
1. <a href="https://onlinecourses.nptel.ac.in/noc15_mg05/preview">https://onlinecourses.nptel.ac.in/noc15_mg05/preview</a> NPTEL, Introduction to Data Analytics, Dr. Nandan Sudarsanam, Department of Management Studies, IIT Madras.														
Mapping of CO with PO’s														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	2	1	1	1	2	0	0	0	0	0	0	1	3	2
CO 2	3	2	2	2	2	0	0	0	0	0	0	0	3	2
CO 3	3	2	2	2	2	0	0	0	0	0	0	0	3	2
CO 4	2	1	1	1	2	0	0	0	0	0	0	0	3	2
CO 5	2	1	1	1	2	0	0	0	1	0	0	1	3	2
Total	12	7	7	7	10	0	0	0	1	0	0	2	15	10
Scaled Value	3	2	2	2	2	0	0	0	1	0	0	1	3	2
Note:														
	Total		0		1-5		6-10		11-15					
	Scaled value		0		1		2		3					
	Relation		No		Low		Medium		High					

<b>COURSE CODE</b>		<b>XGS605</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>C</b>
<b>COURSE NAME</b>		<b>PROFESSIONAL SKILLS</b>	<b>1</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>3</b>
<b>PRE-REQUISITES</b>		<b>-</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>SS</b>	<b>H</b>
<b>C: P: A</b>		<b>2.6:0.4:0</b>	<b>1</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>5</b>
<b>COURSE OUTCOMES:</b>			<b>Domain</b>		<b>Level</b>		
CO1	<i>Ability</i> to understand communications		Cognitive		Remember		
CO2	<i>Apply</i> the known skills for career		Cognitive		Apply		
CO3	<i>Identify</i> inner strength		Cognitive		Remember		
CO4	<i>Construct</i> the attitude as a professional		Cognitive		Create		
CO5	<i>Practicing</i> Etiquettes		Psychomotor		Guided Response		
<b>UNIT I – Communication</b>						<b>9</b>	
1.1 – Brainstorming							
1.2 – LSRW							
<b>UNIT II – Career Skills</b>						<b>9</b>	
2.1 – Resume & CV preparing Skills							
2.2 – Interview Skills							
2.3 – Exploring Career Opportunities							
<b>UNIT III – Team Skills</b>						<b>9</b>	
3.1 – Listening as a Team Skill							
3.2 – Team Building at work place							
<b>UNIT IV – Professional Skills</b>						<b>9</b>	
4.1 – Attitude and Goal Setting							
4.2 – Verbal and Non Verbal Communications							
<b>UNIT V – Professional Etiquettes</b>						<b>9</b>	
Social Etiquettes							
Cultural Ethics at work place							
<b>Suggested Readings:</b>							
(i) Er. A. K. Jain, Dr. Pravin S. R. Bhatia, Dr. A. M. Sheikh Professional Communication Skills S. Chand Publications, 2015							
(ii) Alan Pannett. <i>Key Skills for Professionals: How to Succeed in Professional Services</i> , Kogan Page; 1st edition, 2013							

#### Mapping of COs with GAs:

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	2	0	0	0	1	0	0	1	1	3	0	3
<b>CO2</b>	0	0	0	0	1	0	0	1	1	3	0	3
<b>CO3</b>	2	0	0	0	1	0	0	1	1	3	0	3
<b>CO4</b>	3	0	0	0	1	0	0	1	3	3	1	3
<b>CO5</b>	3	0	0	0	1	0	0	1	1	3	1	3
<b>Total</b>	10	0	0	0	5	0	0	5	7	15	2	15
<b>Scale</b>	3	0	0	0	1	0	0	1	2	3	1	3

1-5= 1, 6-10 = 2, 11-15= 3

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

COURSE CODE			XCS606	L	T	P	C
COURSE NAME			CYBER SECURITY	3	0	0	3
PRE-REQUISITES			-				
C	P	A		L	T	P	H
3	0	0		3	0	0	3
COURSE OUTCOMES				DOMAIN	LEVEL		
CO1	To <i>identify, learn, practice, and understand</i> the basic concepts of networks and cyber-attacks.			Cognitive	Understand		
CO2	To <i>define</i> the concepts of system vulnerability scanning and the scanning tools			Cognitive	Understand		
CO3	To <i>demonstrate, describe, and differentiate</i> the network defense mechanisms and <i>identify and apply</i> the tools used to detect and quarantine network attacks.			Cognitive	Apply		
CO4	To <i>describe, differentiate, apply</i> the different tools for scanning.			Cognitive	Apply		
CO5	To <i>identify</i> and <i>list</i> the types of cybercrimes, cyber laws and cyber-crime investigations.			Cognitive	Understand		
UNIT I – INTRODUCTION							9
History of Information Systems and its Importance, Basics, Changing Nature of Information Systems, Need for Distributed Information Systems: Role of Internet and Web Services. Information System Threats and attacks, Classification of Threats and assessing Damages Security in mobile and Wireless Computing-Security Challenges in Mobile Devices, authentication service Security, Security Implication for Organizations, Laptops security Concepts in Internet and World Wide Web: Brief review of Internet Protocols TCP/IP, IPV4, and IPV6. Functions of various networking components-routers, bridges, switches, hub, gateway and Modulation Techniques.							
UNIT II - SYSTEMS VULNERABILITY SCANNING							9
Overview of vulnerability scanning, Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet.							
UNIT III - NETWORK DEFENCE TOOLS							9
Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System, Cryptool.							
UNIT IV – TOOLS FOR SCANNING							9
Scanning for web vulnerabilities tools: Metasploit tool, Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, THC-Hydra.							
UNIT V - INTRODUCTION TO CYBER CRIME AND LAW							9
Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000. Introduction to Cyber Crime Investigation: Password Cracking, Key loggers and Spyware, Virus and Worms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.							

	LECTURE	TUTORIAL	TOTAL
	45	0	45
<b>TEXT BOOKS</b>			
<ol style="list-style-type: none"> <li>1. Nina Godbole, “Information Systems Security: Security Management, Metrics, Frameworks and Best Practices, w/cd”, Wiley Publications, 2018</li> <li>2. Thomas J. Mowbray, “Cybersecurity: Managing Systems, Conducting Testing and Investigating Intrusions”, Wiley Publications, 2019</li> <li>3. D.S. Yadav, “Foundations of Information Technology”, New Age International publishers, 5<sup>th</sup> Edition, 2018</li> </ol>			
<b>REFERENCES</b>			
<ol style="list-style-type: none"> <li>1. Mike Shema, “Anti-Hacker Tool Kit”, McGraw Hill Education, 7<sup>th</sup> edition, 2020,</li> <li>2. Nina Godbole, SunitBelapure, “Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley publications, 2013, ISBN 10 : 8126521791, ISBN 13 : 9788126521791.</li> <li>3. Corey Schou, Daniel Shoemaker, “Information Assurance for the Enterprise: A Roadmap to Information Security (McGraw-Hill Information Assurance &amp; Security)”, Tata McGraw Hill, 2013, ISBN-10: 0072255242, ISBN-13: 978-0072255249.</li> <li>4. VivekSood, “Cyber Laws Simplified”, McGraw Hill Education (INDIA) Private Limited in 2001, ISBN-10: 0070435065, ISBN-13: 978-0070435063.</li> <li>5. Steven M.Furnell, “Computer Insecurity”, Springer Publisher, 2005 Edition.</li> </ol>			
<b>E – REFERENCES</b>			
<ol style="list-style-type: none"> <li>1. <a href="https://www.cryptool.org/en/">https://www.cryptool.org/en/</a></li> <li>2. <a href="https://www.metasploit.com/">https://www.metasploit.com/</a></li> <li>3. <a href="http://sectools.org/tool/hydra/">http://sectools.org/tool/hydra/</a></li> <li>4. <a href="http://www.hping.org/">http://www.hping.org/</a></li> <li>5. <a href="http://www.winpcap.org/windump/install/">http://www.winpcap.org/windump/install/</a></li> <li>6. <a href="http://www.tcpdump.org/">http://www.tcpdump.org/</a></li> <li>7. <a href="https://www.wireshark.org/">https://www.wireshark.org/</a></li> <li>8. <a href="https://ettercap.github.io/ettercap/">https://ettercap.github.io/ettercap/</a></li> <li>9. <a href="https://www.concise-courses.com/hacking-tools/top-ten/">https://www.concise-courses.com/hacking-tools/top-ten/</a></li> <li>10. <a href="https://www.cirt.net/Nikto2">https://www.cirt.net/Nikto2</a></li> <li>11. <a href="http://sqlmap.org/">http://sqlmap.org/</a></li> </ol>			

### Mapping of COs with POs:

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

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

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

SEMESTER				:	VI											
COURSE CODE				:	XCS607											
COURSE NAME				:	COMPILER DESIGN LABORATORY											
PREREQUISITE				:	FORMAL LANGUAGE AND AUTOMATA THEORY											
	L	T	P	C			C	P	A			L	T	P	H	
	0	0	1	1			0.5	0.25	0.25			0	0	2	2	
Course Objectives																
• To explore the principles, algorithms and methods to design and construction of compiler																
Course Outcome: After the completion of the course, students will be able to											Domain			Level		
CO1	Describe the compilers and its construction tools and specification of tokens.										Cognitive			Understand		
CO2	Describe and apply various parsing techniques for parsing the string.										Cognitive, Psychomotor			Remember Guided Response		
CO3	Illustrate and construct intermediate language.										Cognitive, Psychomotor			Remember Guided Response		
CO4	Describe the code generation and make use of code generator to generate the target code.										Cognitive, Psychomotor			Remember Guided Response		
CO5	Explain the code optimization and apply the optimization techniques.										Cognitive, Psychomotor			Remember Guided Response		
List of Experiments																
S.No		List of Experiments													CO'S	
UNIT I		INTRODUCTION TO COMPILING													10	
		1. Regular Expression into NFA 2. Implementation of Lexical Analyzer Using LexTool. 3. Generate the token using C 4. Conversion of Infix to Postfix Expression 5. Simulate Lexical Analyzer Tools													CO1	
UNIT II		SYNTAX ANALYSIS													10	
		6.Syntax Analysis using YACC. 7. Remove Left Recursion 8.Check Whether the grammar is LL(1) Grammar or not 9. Implementation of Shift Reduce Parsing Algorithm.													CO2	
NIT III		INTERMEDIATE CODE GENERATION													4	
		10.Implementation of Quadruples 11. Implementation of Triples.													CO3	
UNIT IV		CODE GENERATION													3	
		12.Implementation of Intermediate Code Generation.													CO4	
UNIT V		CODE OPTIMIZATION AND RUN TIME ENVIRONMENTS													3	
		13. Implementation of Intermediate Code Optimization													CO5	
								Hours	Tutorial		Practical		Total			
									0		30		30			

Mapping of CO with PO's														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS01	PS02
CO 1	1	1	1	2	1	1	0	0	2	1	0	2	2	2
CO 2	2	2	1	1	2	1	0	0	1	1	0	1	2	2
CO 3	1	3	2	1	1	1	0	0	1	1	0	1	3	2
CO 4	2	2	2	1	2	1	0	0	1	1	0	1	3	2
CO 5	2	3	3	2	2	1	0	0	1	1	0	1	2	2
Total	8	11	9	7	8	5	0	0	6	5	0	6	12	10
Scaled Value	2	3	2	2	2	1	0	0	2	1	0	2	3	2
Note:	Total		0		1-5		6-10		11-15					
	Scaled value		0		1		2		3					
	Relation		No		Low		Medium		High					

<b>COURSE CODE</b>	<b>XCS608</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>BIG DATA ANALYTICS LABORATORY</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A = 0.5:0.5:0</b>		<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>Course Objectives</b> <ul style="list-style-type: none"> <li>• Learn the implementation of basics of Python and text pre-processing</li> <li>• Learn the implementation of classification and clustering algorithms</li> <li>• Learn the implementation of visualization</li> </ul>					
<b>COURSE OUTCOMES</b>		<b>DOMAIN</b>		<b>LEVEL</b>	
CO1	<i>Demonstrate</i> the basics of python for performing data analysis	Cognitive		Apply	
CO2	<i>Demonstrate</i> the use of text preprocessing, regression	Cognitive, Psychomotor		Remember Guided Response	
CO3	<i>Demonstrate</i> the use of classification algorithms	Cognitive, Psychomotor		Remember Guided Response	
CO4	<i>Demonstrate</i> the use of clustering algorithms	Cognitive, Psychomotor		Remember Guided Response	
CO5	<i>Demonstrate</i> the use of visualization	Cognitive, Psychomotor		Remember Guided Response	

<b>S. No.</b>	<b>List of Experiments</b>	<b>Course Outcome</b>
1.	Write a Python program to perform operations on Strings, Lists, Sets and Tuples	CO1
2.	Write a Python script to a) add a key to a dictionary, b) to check if a given key already exists in a dictionary	CO1
3.	Write a program to Implement Text Pre-processing with TF-IDF	CO2
4.	Write a program to Implement Linear and Logistics regression	CO2
5.	Write a program to Implement Decision Tree Classification	CO3
6.	Write a program to Implement Naïve Bayes Classification	CO3
7.	Write a program to Implement Principal Component Analysis	CO4
8.	Write a program to Implement K-Means Clustering	CO4
9.	Introduction to Matplotlib, Seaborn Packages in Python	CO5
10.	Getting and Setting Values in Graphs using Python	CO5

	<b>P01</b>	<b>P02</b>	<b>P03</b>	<b>P04</b>	<b>P05</b>	<b>P06</b>	<b>P07</b>	<b>P08</b>	<b>P09</b>	<b>P010</b>	<b>P011</b>	<b>P012</b>	<b>PS01</b>	<b>PS02</b>
<b>CO 1</b>	3	2	2	2	3	0	0	0	1	0	1	0	3	2
<b>CO 2</b>	3	2	2	2	3	0	0	0	1	0	1	0	3	2
<b>CO 3</b>	3	2	2	2	3	0	0	0	1	0	1	0	3	2
<b>CO 4</b>	3	2	2	2	3	0	0	0	1	0	1	0	3	2
<b>CO 5</b>	3	2	2	2	3	0	0	0	1	0	1	0	3	2
<b>Total</b>	15	10	10	10	15	0	0	0	5	0	5	0	15	10
<b>Scaled Value</b>	3	2	2	2	3	0	0	0	1	0	1	0	3	2

## SEMESTER VII

SEMESTER					:	VII										
COURSE CODE					:	XCS701										
COURSE NAME					:	WEB TECHNOLOGY										
PREREQUISITE					:	FUNDAMENTALS OF PROGRAMMING, OBJECT ORIENTED PROGRAMMING										
	L	T	P	C			C	P	A			L	T	P	H	
	3	0	0	3			3	0	0			3	0	0	3	
Course Objectives																
<ul style="list-style-type: none"><li>To impart the design, development and implementation of static and dynamic web pages.</li><li>To develop programs for web using scripting languages.</li><li>To give an overview of server side programming in web</li></ul>																
Course Outcome: After the completion of the course, students will be able to											Domain C or P or A		Level			
CO1	To design interactive web pages using HTML, DHTML and CSS.										Cognitive		Understand			
CO2	To understand the role of XML,AJAX, and Angular JS										Cognitive		Apply			
CO3	To develop web applications using scripting languages.										Cognitive		Apply			
CO4	To apply the server side programming concepts using in designing a web application.										Cognitive		Apply			
CO5	To develop dynamic web application using server side programming with JSP.										Cognitive		Apply			
COURSE CONTENT																
UNIT I		HTML, DHTML, AND CSS												9		
		Introduction, Elements, Attributes, Heading, Paragraph. Formatting, Link, Table, List, Block, Layout, Html Forms and input, Iframe, Colors, Image Maps and attributes of image area. Introduction to CSS, basic syntax and structure of CSS, different types- internal, external and inline CSS,Basic Introduction of DHTML, Difference between HTML and DHTML, Documentary Object Model (DOM).														
UNIT II		XML, AJAX, ANGULAR JS												9		
		Extended Markup Language (XML): Introduction, XML-Tree - Syntax, Elements, Attributes and Values, Validation and parsing, DTD, XML Schemas, Document Object Model, XML Parsers, AJAX: AJAX Framework, Simple Applications. AngularJS – Introduction, Features, Expressions and Data Biding, Directives, Controllers, Filters, Modules, Forms.														
UNIT III		SCRIPTING LANGUAGES												9		
		Java Scripts - Basic Introduction, Statements, comments, variable, operators, data types, condition, switch, loop, break, Java script functions, event handlers, Document Object Model, Form Validation. CGI Scripts - Introduction, Environment Variable, GET and POST Methods. PHP Scripting - Introduction, Syntax, Variables, Output, Data types, String, Constants, Operator, Decision Control statements, switch-case, Loop, PHP														

[illegible]

Mapping of CO with PO's														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	0	0	1	1	1	0	1	1	1
CO2	1	2	1	1	1	0	0	1	1	2	0	1	1	1
CO3	2	2	1	1	1	0	0	1	1	1	0	1	1	1
CO4	2	2	2	1	1	0	0	1	1	1	0	1	2	1
CO5	2	2	1	1	1	0	0	1	1	1	0	1	2	1
Total	8	9	6	5	5	0	0	5	5	6	0	5	7	5
Scaled Value	2	2	2	1	1	0	0	1	1	2	0	1	2	1
Note :	Total		0	1-5		6-10		11-15						
	Scaled value		0	1		2		3						
	Relation		No	Low		Medium		High						

<b>SEMESTER</b>		:		<b>VII</b>													
<b>COURSE CODE</b>		:		<b>XCS702</b>													
<b>COURSE NAME</b>		:		<b>MACHINE LEARNING</b>													
<b>PREREQUISITE</b>		:		<b>PROBABILITY &amp; STATISTICS, PROGRAMMING FOR PROBLEM SOLVING</b>													
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>			<b>C</b>	<b>P</b>	<b>A</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>		
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>			<b>3</b>	<b>0</b>	<b>0</b>			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>		
<b>Course Objectives</b>																	
• Students understand the fundamentals of Machine Learning																	
• Students learn about supervised and unsupervised learning																	
• Students learn about evolutionary learning																	
<i>Course Outcome: After the completion of the course, students will be able to</i>										<b>Domain C or P or A</b>		<b>Level</b>					
<b>CO1</b>	Describe the essentials of learning and dimensionality reduction										Cognitive		Understand				
<b>CO2</b>	Apply Supervised Learning algorithms such as regression, Bayesian, KNN algorithms										Cognitive		Apply				
<b>CO3</b>	Apply Supervised Learning algorithms such as NN and SVM algorithms										Cognitive		Apply				
<b>CO4</b>	Apply unsupervised learning like K- mean clustering, SOM and Guassian Mixture Model										Cognitive		Apply				
<b>CO5</b>	Discuss the application of Genetic Algorithm										Cognitive		Understand				
<b>COURSE CONTENT</b>																	
<b>UNIT I</b>		<b>INTRODUCTION</b>														<b>9</b>	
		Introduction- Basic definitions, types of learning; hypothesis space and inductive bias; evaluation- accuracy, the confusion matrix, cross-validation, ROC curve; overfitting, Dimensionality Reduction- Linear Discriminant Analysis, Principal Component Analysis;															
<b>UNIT II</b>		<b>SUPERVISED LEARNING - I</b>														<b>9</b>	
		Regression – Linear Regression, Multivariate Regression; Decision Tree Induction; Probability and Bayes learning; KNN; Learning; AdaBoost algorithm															
<b>UNIT III</b>		<b>Supervised Learning II</b>														<b>9</b>	
		Neural network: Perceptron, multilayer feed forward network, linear and non-linear classification, backpropagation network; introduction to deep neural network; Support Vector Machine															
<b>UNIT IV</b>		<b>Unsupervised Learning</b>														<b>9</b>	
		Instance based learning,K- Mean Clustering, Self-Organization Map, Expectation Maximization algorithm,GaussianMixture Model, Hidden Markov Model, Adaptive hierarchical clustering															
<b>UNIT V</b>		<b>Evolutionary Learning</b>														<b>9</b>	
		Genetic Algorithm Basics – String representation, evaluating fitness, population, parent selection; Genetic Operators – Crossover, mutation, elitism, tournament, and niching, Applications of GA- Map Coloring, The Knapsack Problem, Limitations of GA															
										<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>				
										<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>				

**TEXT BOOKS**

1. Andreas Muller Introduction to Machine Learning with Python: A Guide for Data Scientists, Shroff/O'Reilly, 2016, ISBN-10: 9352134575, ISBN-13: 978-9352134571.
2. Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall / CRC Machine Learning and Pattern Recognition Series, 2014.
3. Tom M Mitchell —Machine Learning, First Edition, McGraw Hill Education, 2013

**REFERENCE BOOKS**

1. Ethem Alpaydin, Introduction to Machine Learning, MIT Press, Prentice Hall of India, Third Edition 2014
2. Christopher Bishop. Pattern Recognition and Machine Learning. 2e., Springer, 2006

**E-REFERENCES**

<https://nptel.ac.in/courses/106/106/106106139/>

**Mapping of CO with PO's**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO 1</b>	3	2	3	3	3	2	0	0	0	1	1	1	3	2
<b>CO 2</b>	3	2	3	2	3	2	0	0	0	1	1	1	2	2
<b>CO 3</b>	3	3	3	2	3	2	0	0	0	1	0	1	3	3
<b>CO 4</b>	2	2	3	2	2	2	0	0	0	1	1	1	3	3
<b>CO 5</b>	2	2	2	2	2	3	0	0	0	1	0	0	2	3
<b>Total</b>	13	11	14	11	13	11	0	0	0	5	3	4	13	13
<b>Scaled Value</b>	3	3	3	3	3	3	0	0	0	1	1	1	3	3

**Note:**

<b>Total</b>	0	1-5	6-10	11-15				
<b>Scaled value</b>	0	1	2	3				
<b>Relation</b>	No	Low	Medium	High				

SEMESTER					:	VII										
COURSE CODE					:	XUM008										
COURSE NAME					:	ENVIRONMENTAL STUDIES										
PREREQUISITE					:	-										
	L	T	P	C			C	P	A			L	T	P	H	
	0	0	0	0			2.5	0	0.5			3	0	0	3	
Course Outcome: After the completion of the course, students will be able to											Domain C or P or A			Level		
CO1	Describe the significance of natural resources and explain anthropogenic impacts.										Cognitive			Understand		
CO2	Illustrate the significance of ecosystem, biodiversity and natural geo bio chemical cycles for maintaining ecological balance.										Cognitive			Understand		
CO3	Identify the facts, consequences, preventive measures of major pollutions and recognize the disaster phenomenon										Cognitive			Remember		
CO4	Explain the socio-economic, policy dynamics and practice the control measures of global issues for sustainable development										Cognitive			Analyze		
CO5	Recognize the impact of population and apply the Environmental ethics towards environmental protection.										Cognitive			Apply		
COURSE CONTENT																
UNIT I		INTRODUCTION TO ENVIRONMENTAL STUDIES AND RESOURCES														9
Multidisciplinary nature of environmental studies; Scope and importance; Land resources and land use change; Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and over---exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter---state). Energy resources : Renewable and non- renewable energy sources, use of alternate energy sources, growing energy needs, case studies																
UNIT II		ECOSYSTEMS AND BIODIVERSITY														9
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 - Biodiversity patterns and global biodiversity hot spots. India as a mega-biodiversity nation; Endangered and endemic species of India Threats to biodiversity : Habitat loss, poaching of wildlife, man---wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.																
UNIT III		ENVIRONMENTAL POLLUTION														9
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																
UNIT IV		SOCIAL ISSUES AND THE ENVIRONMENT														9
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 – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD). Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

<b>UNIT V</b>	<b>HUMAN POPULATION AND THE ENVIRONMENT</b>	<b>9</b>
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Human population growth: Impacts on environment, human health and welfare. Resettlement and rehabilitation of project affected persons; case studies. Environmental movements :Chipko, Silent valley, Bishnois of Rajasthan. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
	<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>

### TEXT BOOKS

1. Mahua Basu, S. Xavier, Fundamentals of Environmental Studies, Cambridge University Press, 2019
2. Bharucha Erach, Textbook of Environmental Studies for Undergraduate Courses, Orient Blackswan Pvt Ltd, 2018
3. Anubha Kaushik, C.P. Kaushik, Perspectives in Environmental Studies, New Age International Pvt Ltd Publishers, 2018
4. Divan Shyam, Environmental Law and Policy in India, OUP India, 2019
5. Varun Dutt Sharma, S.K. Pandey, Vimal Kumar sharma, Environmental Education and Disaster Management, CBS Publishers & Distributors, 2019

### REFERENCE BOOKS

1. M.V. Subba Rao, Natural Resources, Conservation, Management and Health Care, Discovery Publishing Pvt. Ltd, 2020
2. Masters Gilbert M. Introduction to Environmental Engineering 3rd Edition, Pearson Education India, 3rd edition, 2015.
3. P.D. Sharma, Ecology and Environment Thirteenth Edition, Rastogi Publications, 2017
4. Dr. Avneesh Gaur, Environmental Engineering and Disaster Management, Vayu Education Of India, 2021

### E-REFERENCES

1. <http://www.e-booksdirectory.com/details.php?ebook=10526>
2. <https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science>
3. <https://www.free-ebooks.net/ebook/What-is-Biodiversity>
4. [https://www.learner.org/courses/envsci/unit/unit\\_vis.php?unit=4](https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4)
5. <http://bookboon.com/en/pollution-prevention-and-control-ebook>
6. <http://www.e-booksdirectory.com/details.php?ebook=8557>
7. <http://www.e-booksdirectory.com/details.php?ebook=6804>
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>

### Mapping of CO's with GA's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	0	0	0	0	0	0	0	0	0	0	1
<b>CO2</b>	2	0	0	0	0	2	1	0	0	1	0	1
<b>CO3</b>	2	1	3	0	0	3	1	0	2	1	0	1
<b>CO4</b>	1	1	2	0	0	3	2	3	0	0	0	1
<b>CO5</b>	2	1	1	0	0	3	0	0	0	0	0	1
<b>Total</b>	<b>10</b>	<b>3</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>11</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>5</b>
<b>Scaled Value</b>	<b>2</b>	<b>1</b>	<b>2</b>			<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

<b>Note:</b>	<b>Total</b>	0	1-5	6-10	11-15				
	<b>Scaled value</b>	0	1	2	3				
	<b>Relation</b>	No	Low	Medium	High				

<b>COURSE CODE</b>	<b>XCS706</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>WEB TECHNOLOGY LABORATORY</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>PREREQUISITES</b>	<b>FUNDAMENTALS OF PROGRAMMING, OBJECT ORIENTED PROGRAMMING</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>	<b>0.5:0.5:0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>

#### LEARNING OBJECTIVES

- To impart the design, development and implementation of Static and Dynamic Web Pages.
- To develop programs for Web using Scripting Languages.
- To give an overview of Server Side Programming in Web

<b>COURSE OUTCOMES</b>		<b>DOMAIN</b>	<b>LEVEL</b>
<b>CO1</b>	To design interactive web pages.	Cognitive Psychomotor	Understand Guided Response
<b>CO2</b>	To understand the role of XML, AJAX, and Angular JS and apply them in implementing web applications.	Cognitive Psychomotor	Understand Guided Response
<b>CO3</b>	To develop web applications using scripting languages.	Cognitive Psychomotor	Understand Guided Response
<b>CO4</b>	To apply the server side programming concepts in designing a web application.	Cognitive Psychomotor	Understand Guided Response
<b>CO5</b>	To develop dynamic web application with server side programming.	Cognitive Psychomotor	Understand Guided Response

<b>S. No.</b>	<b>List of Experiments</b>	<b>COs</b>
1	i. Create a simple html file to demonstrate the use of different tags. ii. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital.	CO1
2	i. Program using XML Schema. ii. Program using XSLT/XSL and AJAX. iii. Program using Angular js.	CO2
3	i. Web application development using PHP and MySQL. ii. Write an HTML page including javascript that takes a given set of integer numbers and shows them after sorting in descending order. iii. Client side scripts for validating web form controls and creating events using Java Script. iv. Program using JSON and Javascript.	CO3
4	i. Write programs in Java Servlet to do the following: a. Set the URL of another server. b. Download the homepage of the server. c. Display the contents of home page with date, content type, and Expiration	CO4

	date. Last modified and length of the home page.	
	ii. Web application development using Nodejs.	
5	ii. JSP program for simple user authentication process (user name, password). iii. Web application development using JSP with JDBC iv. Write a Java Servlets program (1) for email registration form (2) and do form validation using JavaScript	CO5
<b>HOURS</b>		<b>TUTORIAL</b>
		<b>0</b>
		<b>PRACTICAL</b>
		<b>30</b>
		<b>TOTAL</b>
		<b>30</b>

Mapping of CO with PO's														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	1	2	3	1	1	0	0	1	1	2	2	1	2	2
CO 2	1	2	2	1	2	0	0	1	1	2	2	1	2	2
CO 3	2	2	2	1	2	0	0	1	1	2	2	1	2	2
CO 4	2	3	3	1	2	0	0	1	1	2	2	1	2	2
CO 5	2	3	2	1	2	0	0	1	1	2	2	1	2	2
Total	8	12	12	5	9	0	0	5	5	10	10	5	10	10
Scaled Value	2	3	3	1	2	0	0	1	1	2	2	1	2	2
Note:	Total		0		1-5		6-10		11-15					
	Scaled value		0		1		2		3					
	Relation		No		Low		Medium		High					

COURSE CODE	XCS707	L	T	P	C
COURSE NAME	MACHINE LEARNING LABORATORY	0	0	1	1
		L	T	P	H
C:P:A	0.5:0.5:0	0	0	2	2
Learning Objectives					
<ul style="list-style-type: none"><li>Learn the implementation of Supervised Learning methods</li><li>Learn the implementation of Unsupervised Learning methods</li><li>Learn the implementation of Genetic Algorithm</li></ul>					
COURSE OUTCOMES		DOMAIN		LEVEL	
CO1	Demonstrate the skill of data preparation and feature selection methods	Cognitive		Apply	
CO2	Demonstrate the use of basic supervised learning methods	Cognitive Psychomotor		Understand Guided Response	
CO3	Demonstrate the use of advanced supervised learning methods	Cognitive Psychomotor		Understand Guided Response	
CO4	Demonstrate the use of unsupervised learning methods	Cognitive Psychomotor		Understand Guided Response	
CO5	Demonstrate the use of Genetic Algorithm	Cognitive Psychomotor		Understand Guided Response	
S. No.	List of Experiments				Course Outcome
1.	For a given set of training data examples apply the data preprocessing and apply any one feature selection method.				CO1
2.	Demonstrate Regression and Multivariate Regression using appropriate dataset				CO2
3.	Build a Decision Tree and demonstrate how a new data object is classified.				CO2
4.	Write a program to implement naïve Bayesian classifier and show the performance of the classifier using suitable test set.				CO2
5.	Construct a simple Perceptron Neural Network and demonstrate linear and non-linear classification problem				CO3
6.	Construct a Back Propagation network and verify the performance by using suitable training and test set				CO3
7.	Use the same dataset used for experiment 6 to train SVM classifier and compare the performance with back propagation network.				CO3
8.	Create a self-organizing map neural network for learning a set of images and verify the performance				CO4
9.	Create a Gaussian Mixture Model for Image Segmentation				CO4
10.	Write a Genetic Algorithm program for finding parameters which maximizes the Y value of the equation given: <b>Y = w1x1 + w2x2 + w3x3 + w4x4 + w5x5 + w6x6</b> The equation has 6 inputs (x1 to x6) and 6 weights (w1 to w6) as shown and				CO5

	inputs values are (x1,x2,x3,x4,x5,x6)=(4,-2,7,5,11,1). We are looking to find the parameters (weights) that maximize such equation.	
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
CO 1	2	3	3	2	3	2	0	0	0	1	1	1	3	2
CO 2	3	3	3	3	3	2	0	0	0	1	1	1	3	3
CO 3	3	3	3	3	3	3	0	0	0	1	1	1	3	3
CO 4	3	3	3	3	3	3	0	0	0	1	1	1	2	3
CO 5	3	3	3	3	3	3	0	0	0	1	1	1	3	3
Total	14	15	15	14	15	13	0	0	0	5	5	5	14	14
Scaled Value	3	3	3	3	3	3	0	0	0	1	1	1	3	3
Note:	Total		0	1-5	6-10	11-15								
	Scaled value		0	1	2	3								
	Relation		No	Low	Medium	High								

<b>COURSE CODE</b>	<b>XCS708</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>PROJECT PHASE – I</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>
<b>C:P:A</b>	<b>1:0.5:0.5</b>				
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>COURSE OUTCOMES</b>		<b>Domain</b>		<b>Level</b>	
<b>CO1</b>	<i>Identify</i> the Engineering Problem relevant to the domain interest.	Cognitive		Analyze	
<b>CO2</b>	<i>Interpret</i> and <i>Infer</i> Literature survey for its worthiness.	Cognitive		Apply	
<b>CO3</b>	<i>Analyse</i> and <i>identify</i> an appropriate technique for solving the problem.	Cognitive		Apply	
<b>CO4</b>	<i>Perform</i> experimentation /Simulation/Programming/Fabrication, <i>Collect</i> , and <i>interpret</i> data.	Cognitive Psychomotor		Create Guided Response	
<b>CO5</b>	<b>Record</b> and <b>Report</b> the technical findings as a document.	Cognitive		Understand	
<b>CO6</b>	<i>Devote</i> oneself as a responsible member and <i>display</i> as a leader in a team to <i>manage</i> projects.	Cognitive Affective		Create Respond	
<b>CO7</b>	<i>Responding</i> of project findings among the technocrats.	Affective		Respond	

### CO Vs GA Mapping

	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PS O1</b>	<b>PS O2</b>
<b>CO1</b>	3	3	-	-	-	1	1	1	-	-	-	1	3	2
<b>CO2</b>	2	2	-	1	-	-	-	-	-	-	-	0	3	2
<b>CO3</b>	1	1	1	2	2	1	1	1	-	-	-	0	3	2
<b>CO4</b>	2	2	3	3	3	1	1	1	-	-	-	0	3	2
<b>CO5</b>	1	1	1	1	1	-	-	-	2	3	2	3	3	2
<b>CO6</b>	-	-	-	2	-	3	1	3	3	3	2	3	3	2
<b>CO7</b>	1	1	-	2	-	3	-	-	1	3	2	1	3	2
<b>Total</b>	10	10	5	11	6	10	4	6	6	9	6	8	21	14
<b>Scale d</b>	2	2	1	3	2	2	1	2	2	2	2	2	3	3

<b>COURSE CODE</b>	<b>XCS709</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>IN-PLANT TRAINING – III</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>
<b>C:P:A</b>	<b>1:1:0</b>				
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

<b>COURSE OUTCOMES</b>		<b>Domain</b>	<b>Level</b>
<b>CO1</b>	<i>Relate</i> classroom theory with workplace practice	Cognitive	Understand
<b>CO2</b>	<i>Comply with</i> Factory discipline, management, and business practices.	Psychomotor	Guided Response
<b>CO3</b>	<i>Demonstrates</i> teamwork and time management.	Psychomotor	Guided Response
<b>CO4</b>	<i>Describe</i> and <i>display</i> hands-on experience on practical skills obtained during the programme.	Psychomotor	Perception
<b>CO5</b>	<i>Summarize</i> the tasks and activities done by technical documents and oral presentations	Psychomotor	Guided Response

### CO Vs PO Mapping

	<b>PO1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>
<b>CO1</b>	2	0	0	0	0	0	0	0	0	0	0	0
<b>CO2</b>	0	0	0	0	0	0	1	3	0	0	1	0
<b>CO3</b>	0	0	0	0	0	0	0	0	3	1	3	1
<b>CO4</b>	0	1	2	1	3	0	0	0	0	0	0	3
<b>CO5</b>	0	0	0	3		0	0	0	0	3	0	1
<b>Total</b>	2	1	2	4	3	0	1	3	3	4	4	5
<b>Scaled</b>	1	1	1	1	1	0	1	1	1	1	1	1

<b>COURSE CODE</b>	<b>XCS804</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>	<b>PROJECT WORK PHASE – II</b>	<b>0</b>	<b>0</b>	<b>9</b>	<b>9</b>
<b>C:P:A</b>	<b>6:1.5:1.5</b>				
		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
		<b>0</b>	<b>0</b>	<b>18</b>	<b>18</b>
<b>COURSE OUTCOMES</b>		<b>DOMAIN</b>		<b>LEVEL</b>	
<b>CO1</b>	<i>Identify</i> the Engineering Problem relevant to the domain interest.	Cognitive		Analyze	
<b>CO2</b>	<i>Interpret</i> and <i>Infer</i> Literature survey for its worthiness.	Cognitive		Apply	
<b>CO3</b>	<i>Analyze</i> and <i>identify</i> an appropriate technique for solve the problem.	Cognitive		Apply	
<b>CO4</b>	<i>Perform</i> experimentation /Simulation/Programming/Fabrication, <i>Collect</i> , and <i>interpret</i> data.	Cognitive Psychomotor		Apply Guided Response	
<b>CO5</b>	<i>Record and Report the</i> technical findings as a document.	Cognitive		Understand	
<b>CO6</b>	<i>Devote</i> oneself as a responsible member and <i>display</i> as a leader in a team to <i>manage</i> projects.	Cognitive Affective		Create Respond	
<b>CO7</b>	<i>Responding</i> of project findings among the technocrats.	Affective		Respond	

### CO Vs PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	3	3	-	-	-	1	1	1	-	-	-	1	3	2
<b>CO2</b>	2	2	-	1	-	-	-	-	-	-	-	-	3	2
<b>CO3</b>	1	1	1	2	2	1	1	1	-	-	-	-	3	2
<b>CO4</b>	2	2	3	3	3	1	1	1	-	-	-	-	3	2
<b>CO5</b>	1	1	1	1	1	-	-	-	2	3	2	3	3	2
<b>CO6</b>	-	-	-	2	-	3	1	3	3	3	2	3	3	2
<b>CO7</b>	1	1	-	2	-	3	-	-	1	3	2	1	3	2
<b>Total</b>	10	10	5	11	6	10	4	6	6	9	6	8	21	14
<b>Scaled</b>	2	2	1	3	2	2	1	2	2	2	2	2	3	3

## ELECTIVES

<b>COURSE CODE</b>				<b>XCSE51</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>				<b>GRAPH THEORY</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
					<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C</b>	<b>P</b>	<b>A</b>	<b>3:0:0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>COURSE OUTCOMES</b>					<b>DOMAIN</b>		<b>LEVEL</b>	
<b>CO1</b>	Write precise and accurate mathematical definitions of objects in graph theory.				Cognitive		Understand	
<b>CO2</b>	Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.				Cognitive		Apply	
<b>CO3</b>	Validate and critically assess a mathematical proof.				Cognitive		Apply	
<b>CO4</b>	Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions.				Cognitive		Apply	
<b>CO5</b>	Reason from definitions to construct mathematical proofs.				Cognitive		Apply	
<b>UNIT I INTRODUCTION</b>					<b>9</b>			
Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits –Connectedness – Components – Euler graphs – Hamiltonian paths and circuits – Trees – Properties of trees – Distance and centers in tree – Rooted and binary trees.								
<b>UNIT II TREES, CONNECTIVITY &amp; PLANARITY</b>					<b>9</b>			
Spanning trees – Fundamental circuits – Spanning trees in a weighted graph – cut sets – Properties of cut set – All cut sets – Fundamental circuits and cut sets – Connectivity and separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and geometric graphs – Planer graphs – Different representation of a planer graph.								
<b>UNIT III MATRICES, COLOURING AND DIRECTED GRAPH</b>					<b>8</b>			
Chromatic number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four color problem – Directed graphs – Types of directed graphs – Digraphs and binary relations – Directed paths and connectedness – Euler graphs.								
<b>UNIT IV PERMUTATIONS &amp; COMBINATIONS</b>					<b>9</b>			
Fundamental principles of counting - Permutations and combinations - Binomial theorem - combinations with repetition - Combinatorial numbers - Principle of inclusion and exclusion - Derangements-Arrangements with forbidden positions.								
<b>UNIT V GENERATING FUNCTIONS</b>					<b>10</b>			
Generating functions - Partitions of integers - Exponential generating function – Summation operator - Recurrence relations - First order and second order – Non-homogeneous recurrence relations - Method of generating functions.								
					<b>LECTURE</b>	<b>TUTORIAL</b>		<b>TOTAL</b>
					<b>45</b>	<b>0</b>		<b>45</b>
<b>REFERENCES</b>								

1. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.
2. Grimaldi R.P.  
"Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley, 1994.
3. Clark J. and Holton D.A, "A First Look at Graph Theory", Allied Publishers, 1995.
4. Mott J.L., Kandel A. and Baker T.P. "Discrete Mathematics for Computer Scientists and Mathematicians", Prentice Hall of India, 1996.
5. Liu C.L., "Elements of Discrete Mathematics", McGraw Hill, 1985.
6. Rosen K.H., "Discrete Mathematics and Its Applications", McGraw Hill, 2007.

**E-References:**

- <https://nptel.ac.in/courses/106108054/>
- <https://nptel.ac.in/courses/111106086/51>

**Mapping of COs with POs:**

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

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

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

SEMESTER				: V										
COURSE CODE				: XCSE52										
COURSE NAME				: REAL TIME SYSTEMS										
PREREQUISITE				: OPERATING SYSTEMS										
L	T	P	C			C	P	A			L	T	P	H
3	0	0	3			3	0	0			3	0	0	3
Course Objectives														
• To learn and understand the basic of tasks, scheduling, programming languages and databases														
• To analyze the real time communication														
• To understand and analyze evaluation techniques and clock synchronization														
Course Outcome: After the completion of the course, students will be able to											Domain C or P or A		Level	
CO1	Describe the real time operating system concepts, the associated issues & Techniques										Cognitive		Understand	
CO2	Understand the fundamentals of Scheduling and features of programming languages										Cognitive		Understand	
CO3	Discuss the concepts of Real Time Databases										Cognitive		Apply	
CO4	Explain the fundamentals of real time communication										Cognitive		Understand	
CO5	Understand the evaluation techniques present in Real Time System										Cognitive		Understand	
COURSE CONTENT														
UNIT I		REAL TIME SYSTEM AND SCHEDULING												9
		Introduction - Issues in Real Time Computing, Structure of a Real Time System. Task Classes, Performance Measures for Real Time Systems, Estimating Program Run times. Task Assignment and Scheduling - Classical Uniprocessor scheduling algorithms, UniProcessor scheduling of IRIS Tasks, Task Assignment, Mode Changes, and Fault Tolerant Scheduling.												
UNIT II		PROGRAMMING LANGUAGES AND TOOLS												9
		Programming Language and Tools – Desired Language characteristics, Data Typing, Control structures, Facilitating Hierarchical Decomposition, Packages, Run-time (Exception) Error handling, Overloading and Generics, Multitasking, Low Level programming, Task scheduling, Timing Specifications, Programming Environments, Run-time Support.												
UNIT III		REAL TIME DATABASES												9
		Real time Databases - Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency Control Issues, Disk Scheduling Algorithms, Two-phase Approach to improve Predictability, Maintaining Serialization Consistency, Databases for Hard Real Time systems.												
UNIT IV		COMMUNICATION												9
		Real-Time Communication - Communications Media, Network Topologies Protocols, Fault Tolerant Routing. Fault Tolerance Techniques - Fault Types, Fault Detection. Fault Error containment Redundancy, Data Diversity, Reversal Checks, Integrated Failure handling.												

UNIT V	EVALUATION TECHNIQUES AND CLOCK SYNCHRONIZATION	9			
	Reliability Evaluation Techniques - Obtaining Parameter Values, Reliability Models for Hardware Redundancy, Software Error models. Clock Synchronization - Clock, A Non fault-Tolerant Synchronization Algorithm, Impact of Faults, Fault Tolerant Synchronization in Hardware, Fault Tolerant Synchronization in Software.				
		<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
		<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>
<b>TEXT BOOKS</b>					
1. C.M. Krishna, Kang G. Shin, “Real-Time Systems”, McGraw-Hill International Editions, 2017					
<b>REFERENCE BOOKS</b>					
1. Stuart Bennett, “Real Time Computer Control-An Introduction”, Second edition, Pearson,2009					
2. Peter D. Lawrence, “Real time Micro Computer System Design – An Introduction”, McGraw Hill, 1988.					
3. S.T. Allworth and R.N. Zobel, “Introduction to real time software design”, Macmillan, Second Edition, 1987.					
4. R.J.A Buhur, D.L. Bailey, “An Introduction to Real-Time Systems”, Prentice-Hall International, 1999.					
5. Philip.A.Laplante “Real Time System Design and Analysis” PHI , III Edition, April 2004.					
<b>E-REFERENCES</b>					
1. Real Time Systems by Prof. Rajib Mall, Prof. Durga Prasad Mohapatra   IIT Kharagpur, NIT Rourkela <a href="https://onlinecourses.nptel.ac.in/noc21_cs98/preview">https://onlinecourses.nptel.ac.in/noc21_cs98/preview</a>					

Mapping of CO with PO's														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	1	1	1	1	0	0	0	1	0	0	0	1	1
CO 2	2	1	1	1	1	0	0	0	0	0	0	0	1	1
CO 3	3	2	2	2	1	0	0	0	1	0	1	0	2	1
CO 4	2	1	1	1	1	0	0	0	1	0	0	0	1	1
CO 5	2	1	1	1	1	0	0	0	1	0	0	0	1	1
Total	11	6	6	6	5	0	0	0	4	0	1	0	6	5
Scaled Value	3	2	2	2	1	0	0	0	1	0	1	0	2	1

<b>Note:</b>	<b>Total</b>	0	1-5	6-10	11-15				
	<b>Scaled value</b>	0	1	2	3				
	<b>Relation</b>	No	Low	Medium	High				

SEMESTER		:	V													
COURSE CODE		:	XCSE53													
COURSE NAME		:	SOFT COMPUTING													
PREREQUISITE		:	NIL													
	L	T	P	C			C	P	A			L	T	P	H	
	3	0	0	3			3	0	0			3	0	0	3	
COURSE OBJECTIVES																
Course Outcome: After the completion of the course, students will be able to											Domain C or P or A			Level		
CO1	Illustrate the nuance of soft computing and depict the Genetic Algorithm concepts										Cognitive			Understand		
CO2	explain the evolution of Artificial Neural Network and various types of neural networks										Cognitive			Understand		
CO3	Recognize the supervised learning method and unsupervised learning methods and demonstrate it in various applications										Cognitive			Understand Apply		
CO4	Comprehend the fuzzy systems and its hybrid methods and demonstrate it in various applications										Cognitive			Understand Apply		
CO5	Describe the Swarm Intelligence usage										Cognitive			Understand		
UNIT I: SOFT COMPUTING AND GENETIC ALGORITHM															9	
What is soft computing? Differences between soft computing and hard computing, Soft Computing constituents, Methods in soft computing, Applications of Soft Computing. Introduction to Genetic Algorithms (GA), Representation, Operators in GA, Fitness function, population, building block hypothesis and schema theorem; Genetic algorithms operators- methods of selection, crossover and mutation, simple GA(SGA), other types of GA, generation gap, steady state GA, Applications of GA																
UNIT II: NEURAL NETWORKS															9	
Neural Network Concept, biological neural system, Evolution of neural network, McCulloch-Pitts neuron model, activation functions, feedforward networks, feedback networks, learning rules – Hebbian, Delta, Perceptron learning and Windrow-Hoff, winner-take-all.																
UNIT III: SUPERVISED AND UNSUPERVISED LEARNING															9	
Perceptron learning, single l layer/multilayer perceptron, linear separability, hidden layers, back popagation algorithm, Radial Basis Function network; Unsupervised learning - Kohonen, SOM, Counter-propagation, ART, Reinforcement learning, adaptive resonance architecture, applications of neural networks to pattern recognition systems such as character recognition, face recognition, application of neural networks in image processing.																
UNIT IV: FUZZY SYSTEMS															9	
Basic definition and terminology, set-theoretic operations, Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions, Fuzzy Rules & Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making; Neuro-fuzzy mmodeling- Adaptive Neuro-Fuzzy Inference Systems, Coactive Neuro-Fuzzy Modeling, Classification and Regression Trees, Data Clustering Algorithms, Rulebase Structure Identification and Neuro-Fuzzy Control , Applications of neuro-fuzzy modeling.																
UNIT V SWARM INTELLIGENCE															9	
What is swarm intelligence? Various animal behaviour which have been used as examples, ant colony optimization, swarm intelligence in bees, flocks of birds, shoals of fish, ant-based routing, particle swarm optimization																
									LECTURE		TUTORIAL		TOTAL			

	<b>45</b>	<b>0</b>	<b>45</b>
<b>TEXT BOOKS</b>			
1. S.N. Shivanandam, Principle of soft computing, Wiley. ISBN13: 9788126527410 (2011) 2. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2003. 3. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1995. 4. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn., 2003. 5. Data Mining: Concepts and Techniques, 4ed, Jiawei Han, 2022, ISBN13: 978-8131267660.			
<b>REFERENCES</b>			
1. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998. 2. David E. Goldberg, Genetic Algorithms in Search, Optimization & Machine Learning, Addison Wesley, 1997.			
<b>E-REFERENCES:</b>			
1. Introduction To Soft Computing, By Prof. Debasis Samanta, IIT Kharagpur, <a href="https://onlinecourses.nptel.ac.in/noc20_cs17/preview">https://onlinecourses.nptel.ac.in/noc20_cs17/preview</a> 2. <a href="https://wekatutorial.com/">https://wekatutorial.com/</a>			

### Mapping of COs with POs:

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

<b>Note:</b>	<b>Total</b>	0	1-5	6-10	11-15				
	<b>Scaled value</b>	0	1	2	3				
	<b>Relation</b>	No	Low	Medium	High				

SEMESTER			V					
COURSE CODE			XCSE54		L	T	P	C
COURSE NAME			HUMAN COMPUTER INTERACTION		3	0	0	3
C	P	A			L	T	P	H
3	0	0			3	0	0	3
PREREQUISITES			ARTIFICIAL INTELLIGENCE, IoT					
Course Objectives								
<ul style="list-style-type: none"><li>To Learn the foundations of Human Computer Interaction</li><li>To Know the design technologies for individuals and persons with disabilities</li><li>To Understand mobile HCI</li><li>To learn the guidelines for user interface.</li></ul>								
Course Outcomes								
					Domain	Level		
CO1	Design effective dialog for HCI.				Cognitive	Understand		
CO2	Design effective HCI for individuals and persons with disabilities.				Cognitive	Apply		
CO3	Assess the importance of user feedback.				Cognitive	Apply		
CO4	Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.				Cognitive	Understand		
CO5	Develop meaningful user interface.				Cognitive	Apply		
COURSE CONTENTS								Hours
UNIT I	FOUNDATIONS OF HCI							9
The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.								
UNIT II	DESIGN & SOFTWARE PROCESS							9
Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.								
UNIT III	MODELS AND THEORIES							9
Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.								
UNIT IV	MOBILE HCI							9
Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.								
UNIT V	WEB INTERFACE DESIGN							9
Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.								
			LECTURE	TUTORIAL	PRACTICAL	TOTAL		
			45	0	0	45		

<b>TEXT BOOKS</b>														
1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004.														
2. Brian Fling, “Mobile Design and Development”, First Edition , O’Reilly Media Inc., 2009.														
3. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O.Reilly, 2009.														
<b>REFERENCES</b>														
1. Prece, Rogers, Sharps, “Interaction Design”, Wiley Dreamtech,2006.														
2. Soren Lauesen User Interface Design, , Pearson Education,2004.														
<b>E-REFERENCES</b>														

### Mapping of CO with PO’s

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
<b>CO 1</b>	2	1	0	0	3	0	0	0	0	0	0	0	3	2
<b>CO 2</b>	3	2	1	1	2	0	0	0	0	0	0	0	3	2
<b>CO 3</b>	3	2	1	1	0	0	0	0	0	0	0	0	2	2
<b>CO 4</b>	3	2	0	1	0	0	0	0	0	0	0	0	2	2
<b>CO 5</b>	3	2	1	3	2	0	0	0	0	0	0	0	3	3
<b>Total</b>	14	9	3	6	7	0	0	0	0	0	0	0	13	11
<b>Scaled Value</b>	3	2	1	2	2	0	0	0	0	0	0	0	3	3

1 – 5 → 1,                      6 – 10 → 2,                      11 – 15 → 3  
0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

SEMESTER					:	VI										
COURSE CODE					:	XCSE61										
COURSE NAME					:	INFORMATION THEORY AND CODING										
PREREQUISITE					:	PROBABILITY THEORY										
	L	T	P	C			C	P	A			L	T	P	H	
	3	0	0	3			3.0	0.0	0.0			3	0	0	3	
Course Objectives																
<ul style="list-style-type: none"><li>• To understand the concepts of transmission, processing and knowledge extraction from the information.</li></ul>																
<ul style="list-style-type: none"><li>• To understand the concepts of compression and decompression techniques</li></ul>																
<ul style="list-style-type: none"><li>• To reduce error rate of data communication</li></ul>																
Course Outcome: After the completion of the course, students will be able to											Domain			Level		
CO1	Describe the basic notions of information and channel capacity										Cognitive			Understand		
CO2	Describe the Pulse code Modulation Systems										Cognitive			Understand		
CO3	Explain and Apply the error control coding										Cognitive			Understand		
CO4	Describe and Analyze compression and decompression techniques										Cognitive			Understand		
CO5	Explain and Illustrate Multimedia communication Techniques										Cognitive			Understand		
COURSE CONTENT																
UNIT I		INFORMATION ENTROPY FUNDAMENTALS													9	
		Uncertainty, Information and Entropy – Source coding Theorem – Huffman coding –Shannon Fano coding – Discrete Memory less channels – channel capacity – channel coding Theorem – Channel capacity Theorem.														
UNIT II		DATA AND VOICE CODING													9	
		Differential Pulse code Modulation – Adaptive Differential Pulse Code Modulation – Adaptive subband coding – Delta Modulation – Adaptive Delta Modulation – Coding of speech signal at low bit rates –Vocoders and LPC.														
UNIT III		ERROR CONTROL CODING													9	
		Linear Block codes – Syndrome Decoding – Minimum distance consideration – cyclic codes – Generator Polynomial – Parity check polynomial – Encoder for cyclic codes – calculation of syndrome – Convolutional codes.														
UNIT IV		COMPRESSION TECHNIQUES													9	
		Principles – Text compression – Static Huffman Coding – Dynamic Huffman coding – Arithmetic coding – Image Compression – Graphics Interchange format – Tagged Image File Format – Digitized documents – Introduction to JPEG standards.														

UNIT V	AUDIO AND VIDEO CODING												9	
	Linear Predictive coding – code excited LPC – Perceptual coding, MPEG audio coders – Dolby audio coders – Video compression – Principles – Introduction to H.261 & MPEG Video standards.													
									L	T	P	Total		
									45	0	0	45		
TEXT BOOKS														
1.R Bose, “Information Theory, Coding and Crptography”, TMH 2007														
2. Simon Haykin, Communication Systems, John Wiley & sons, 4th Edition, 2001.														
3. Fred Halsall, “Multimedia Communications, Applications Networks Protocols and Standards”, Pearson Education, Asia 2002; Chapters: 3,4,5.														
REFERENCE BOOKS														
1. Mark Nelson, “Data Compression Book”, BPB Publication 1992.														
2. Watkinson J, “Compression in Video and Audio”, Focal Press, London 2002.														
E-REFERENCES														
1. NPTEL , Communication Engineering, Prof. Surendra Prasad, Department of Electrical Engineering Indian Institute of Technology, Delhi HauzKhas New Delhi -110 016														
IS Codes														
Mapping of CO with PO’s														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	2	1	0	1	1	0	1	0	0	0	1	2
CO 2	3	2	1	1	0	0	0	0	1	0	0	0	2	2
CO 3	3	2	1	1	0	1	1	0	1	0	0	0	2	2
CO 4	3	2	2	0	0	1	1	0	1	0	0	0	2	2
CO 5	3	2	2	1	0	1	1	0	1	0	0	0	2	3
Total	15	10	8	4	0	4	4	0	5	0	0	0	9	11
Scaled Value	3	2	2	1	0	1	1	0	1	0	0	0	2	3
Note:														
	Total		0		1-5		6-10		11-15					
	Scaled value		0		1		2		3					
	Relation		No		Low		Medium		High					

<b>SEMESTER</b>		:		<b>VI</b>												
<b>COURSE CODE</b>		:		<b>XCSE62</b>												
<b>COURSE NAME</b>		:		<b>DISTRIBUTED SYSTEMS</b>												
<b>PREREQUISITE</b>		:		<b>-</b>												
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>			<b>C</b>	<b>P</b>	<b>A</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>	
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>			<b>3</b>	<b>0</b>	<b>0</b>			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>COURSE OBJECTIVES</b>																
<ul style="list-style-type: none"><li>Understand classic distributed algorithms for synchronization, consistency, fault-tolerance, etc.</li><li>Understand how modern distributed systems are designed and engineered.</li><li>To learn the principles, architectures, algorithms and programming models used in distributed systems.</li></ul>																
<b>CO1</b>	To <b>Describe</b> basics of Distributed Systems and trends in Distributed Systems and Challenges.										Cognitive		Understand			
<b>CO2</b>	To <b>Define</b> inter process communication and internet protocols for external data representation and multi cast communication.										Cognitive		Remember			
<b>CO3</b>	To <b>Explain</b> peer to peer services and different file system										Cognitive		Understand			
<b>CO4</b>	To <b>Discuss</b> the synchronization and replication in distributed system.										Cognitive		Understand			
<b>CO5</b>	To <b>Apply</b> the process management and resource management in distributed system.										Cognitive		Apply			
<b>UNIT I: INTRODUCTION</b>														<b>9</b>		
Introduction - Examples of Distributed Systems-Trends in Distributed Systems - Focus on resource sharing - Challenges. Case study: World Wide Web.																
<b>UNIT II: COMMUNICATION IN DISTRIBUTED SYSTEM</b>														<b>9</b>		
System Model - Inter process Communication - the API for internet protocols - External data representation and Multicast communication. <b>Network virtualization:</b> Overlay networks. <b>Case study:</b> MPI <b>Remote Method Invocation And Objects:</b> Remote Invocation - Introduction - Request-reply protocols - Remote procedure call - Remote method invocation. <b>Case study:</b> Java RMI – Group communication - Publish-subscribe systems - Message queues - Shared memory approaches - Distributed objects - Case study: Enterprise Java Beans -from objects to components.																
<b>UNIT III: PEER TO PEER SERVICES AND FILE SYSTEM</b>														<b>9</b>		
Peer-to-peer Systems - Introduction - Napster and its legacy - Peer-to-peer - Middleware - Routing overlays. <b>Overlay case studies:</b> Pastry, Tapestry- Distributed File Systems -Introduction - File service architecture - Andrew File system. <b>File System:</b> Features-File model -File accessing models - File sharing semantics <b>Naming:</b> Identifiers, Addresses, Name Resolution - Name Space Implementation - Name Caches - LDAP.																
<b>UNIT IV: SYNCHRONIZATION AND REPLICATION</b>														<b>9</b>		
Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks - Global states - Coordination and Agreement - Introduction - Distributed mutual exclusion - Elections - Transactions and Concurrency Control- Transactions -Nested transactions - Locks - Optimistic concurrency control - Timestamp ordering - Atomic Commit protocols -Distributed deadlocks - Replication - Case study - Coda.																
<b>UNIT V: PROCESS &amp; RESOURCE MANAGEMENT</b>														<b>9</b>		
<b>Process Management:</b> Process Migration: Features, Mechanism - Threads: Models, Issues, Implementation.																
<b>Resource Management:</b> Introduction- Features of Scheduling Algorithms -Task Assignment Approach - Load Balancing Approach - Load Sharing Approach.																

	LECTURE	TUTORIAL	TOTAL
	45	0	45
<b>TEXT BOOK</b>			
1. George Coulouris, Jean Dollimore and Tim Kindberg, "Distributed Systems Concepts and Design", Fifth Edition, Pearson Education, 2012.			
<b>REFERENCES</b>			
1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.			
2. Tanenbaum A.S., Van Steen M., "Distributed Systems: Principles and Paradigms", Pearson Education, 2007.			
3. Liu M.L., "Distributed Computing, Principles and Applications", Pearson Education, 2004.			
4. Nancy A Lynch, "Distributed Algorithms", Morgan Kaufman Publishers, USA, 2003			
<b>E REFERENCES</b>			
1. <a href="http://nptel.ac.in/courses/106106107/">http://nptel.ac.in/courses/106106107/</a>			
2. <a href="https://www.cs.york.ac.uk/rts/books/.../distributedSystems.pdf">https://www.cs.york.ac.uk/rts/books/.../distributedSystems.pdf</a>			

Mapping of CO with PO's														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	0	0	1	1	1	0	1	1	1
CO2	1	2	1	1	1	0	0	1	1	2	0	1	1	1
CO3	2	2	2	2	1	0	0	1	1	1	0	1	1	1
CO4	2	3	2	2	2	0	0	1	1	2	0	1	2	1
CO5	2	3	3	2	2	0	0	1	1	2	0	1	2	1
Total	8	11	9	8	7	0	0	5	5	8	0	5	7	5
Scaled Value	2	3	2	2	2	0	0	1	1	2	0	1	2	1
Note :	Total		0	1-5		6-10		11-15						
	Scaled value		0	1		2		3						
	Relation		No	Low		Medium		High						

SEMESTER					:	VI												
COURSE CODE					:	XCSE63												
COURSE NAME					:	DATA MINING												
PREREQUISITE					:	LINEAR ALGEBRA, CALCULUS, AND PROBABILITY THEORY												
	L	T	P	C			C	P	A			L	T	P	H			
	3	0	0	3			3	0	0			3	0	0	3			
COURSE OBJECTIVES																		
<ul style="list-style-type: none"><li>To learn data mining concepts understand association rules mining.</li></ul>																		
<ul style="list-style-type: none"><li>To discuss classification algorithms learn how data is grouped using clustering techniques.</li></ul>																		
<ul style="list-style-type: none"><li>To develop the abilities of critical analysis to data mining systems and applications.</li></ul>																		
<ul style="list-style-type: none"><li>To implement practical and theoretical understanding of the technologies for data mining.</li></ul>																		
<ul style="list-style-type: none"><li>To understand the strengths and limitations of various data mining models</li></ul>																		
												Domain		Level				
CO1	Understand the basics of data mining and data warehousing concepts and data preprocessing tasks											Cognitive		Understand				
CO2	Understand and Apply the association rules in large datasets.											Cognitive		Apply				
CO3	Understand and Apply the classification techniques in large datasets.											Cognitive		Apply				
CO4	Understand and Apply clustering techniques to solve real world problems in business and scientific information using data mining											Cognitive		Understand				
CO5	Classify web pages, extracting knowledge from the web and text.											Cognitive		Apply				
COURSE CONTENT																		
UNIT I: INTRODUCTION																	9	
Introduction to Data Mining -Definition, KDD, Challenges, Overview of Data warehousing- Strategic information and the need for Data warehousing, Defining a Data warehouse, Evolution of Data warehousing, Data warehousing and Business, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binaryzation, Data Transformation; Measures of Similarity and Dissimilarity- Basics.																		
UNIT 2:ASSOCIATION RULES																	9	
Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.																		
UNIT III: CLASSIFICATION																	9	
Problem Definition, General Approaches to solving a classification problem , Evaluation of Classifiers , Classification techniques, Decision Trees-Decision tree Construction , Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm for Decision tree Induction ; Naive-Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.																		
UNIT IV: CLUSTERING																	9	
Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical																		

clocks - Global states - Coordination and Agreement - Introduction - Distributed mutual exclusion - Elections - Transactions and Concurrency Control- Transactions -Nested transactions - Locks - Optimistic concurrency control - Timestamp ordering - Atomic Commit protocols -Distributed deadlocks - Replication - Case study - Coda.

## UNIT V: DATA MINING APPLICATIONS

9

Mining complex data objects- Web Mining -Web Content Mining, Web Structure Mining, Web Usage Mining, Text Mining –Unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

	LECTURE	TUTORIAL	TOTAL
	45	0	45

### TEXT BOOK

1. Jiawei Han, Micheline Kamber, Data Mining- Concepts and Techniques, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.
2. Data Warehousing Fundamentals for IT Professionals, Second Edition by Paulraj Ponniah, Wiley India.
3. Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Introduction to Data Mining, Pearson Education, 2006.
4. Data Mining and Analysis: Fundamental Concepts and Algorithms Book by Mohammed J. Zaki and Wagner Meira, 2013.

### REFERENCES

1. Arun K Pujari, Data Mining Techniques, 3rd Edition, Universities Press.
2. T.V Suresh Kumar, B. Esware Reddy, Jagadish S Kalimani, Data Mining Principles & Applications, Elsevier.
3. Vikram Pudi, P Radha Krishna, Data Mining, Oxford University Press.

### E REFERENCES

1. [https://www.kdnuggets.com/data\\_mining\\_course/references.html](https://www.kdnuggets.com/data_mining_course/references.html)
2. [https://www.researchgate.net/publication/325216437\\_Good\\_references\\_on\\_data\\_mining\\_and\\_analytics](https://www.researchgate.net/publication/325216437_Good_references_on_data_mining_and_analytics)

Mapping of CO with PO's														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	0	0	1	1	1	0	1	1	1
CO2	1	2	2	1	1	0	0	1	1	2	0	1	1	1
CO3	2	2	2	2	1	0	0	1	1	2	0	1	1	1
CO4	2	3	2	2	2	0	0	1	2	2	0	2	2	1
CO5	2	3	3	2	2	0	0	1	1	2	0	1	1	1
Total	8	11	10	8	7	0	0	5	6	9	0	6	6	5
Scaled Value	2	3	2	2	2	0	0	1	2	2	0	2	2	1
Note:														
	Total	0		1-5		6-10		11-15						
	Scaled value	0		1		2		3						
	Relation	No		Low		Medium		High						

SEMESTER					:	VI										
COURSE CODE					:	XCSE64										
COURSE NAME					:	CLOUD COMPUTING										
PREREQUISITE					:	PROGRAMMING SKILLS, DATABASE MANAGEMENT SYSTEM, SECURITY, OPERATING SYSTEMS, NETWORKING AND VIRTUALIZATION										
	L	T	P	C			C	P	A			L	T	P	H	
	3	0	0	3			3.0	0.0	0.0			3	0	0	3	

### Course Objectives

1. To understand the concepts of cloud computing and its services
2. To understand the history of cloud and its architecture.
3. To understand various cloud related technologies

The Cloud computing course objectives are to understand the current trend and basics of cloud computing, cloud enabling technologies and cloud security.

<i>Course Outcome: After the completion of the course, students will be able to</i>		<b>Domain</b>	<b>Level</b>
<b>CO1</b>	<b>Describe and understand</b> the concepts of cloud computing and its services	Cognitive	Understand
<b>CO2</b>	<b>Describe, and understand</b> the history and evolution of cloud from the present technologies and virtualization concepts in cloud.	Cognitive	Understand
<b>CO3</b>	<b>Describe and understand</b> the various cloud services and architecture.	Cognitive	Understand
<b>CO4</b>	<b>Explain and Analyze</b> , the various security services and management of resource in cloud.	Cognitive	Analyze
<b>CO5</b>	<b>Understand, Explain, and apply</b> the case studies to apply in various cloud technologies.	Cognitive	Apply

### COURSE CONTENT

<b>UNIT I</b>	<b>INTRODUCTION</b>	<b>9</b>
	Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.	
<b>UNIT II</b>	<b>CLOUD ENABLING TECHNOLOGIES</b>	<b>9</b>
	Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices –Virtualization Support and Disaster Recovery.	
<b>UNIT III</b>	<b>CLOUD ARCHITECTURE, SERVICES AND STORAGE</b>	<b>9</b>
	Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.	
<b>UNIT IV</b>	<b>RESOURCE MANAGEMENT AND SECURITY IN CLOUD</b>	<b>9</b>
	Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning	

	Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.	
<b>UNIT V</b>	<b>CLOUD TECHNOLOGIES AND ADVANCEMENTS</b>	<b>9</b>
	Hadoop – MapReduce – Virtual Box -- Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of freedom	
	<b>L</b>	<b>T</b>
	<b>P</b>	<b>Total</b>
	<b>45</b>	<b>0</b>
	<b>0</b>	<b>45</b>
<b>TEXT BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.</li> <li>2. Rittinghouse, John W., and James F. Ransome, —Cloud Computing: Implementation, Management and Securityl, CRC Press, 2017.</li> </ol>		
<b>REFERENCE BOOKS</b>		
<ol style="list-style-type: none"> <li>1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, —Mastering Cloud Computingll, Tata Mcgraw Hill, 2013.</li> <li>2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approachll, Tata Mcgraw Hill, 2009.</li> <li>3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice)ll, O'Reilly, 2009.</li> </ol>		
<b>E-REFERENCES</b>		
<ol style="list-style-type: none"> <li>1. <a href="http://cloud-standards.org/wiki/index.php?title=Main_Page">http://cloud-standards.org/wiki/index.php?title=Main_Page</a></li> <li>2. <a href="http://webpages.iust.ac.ir/hsalimi/.../89.../Cloud%20Common%20standards.ppt">webpages.iust.ac.ir/hsalimi/.../89.../Cloud%20Common%20standards.ppt</a> <a href="http://topennebula.org">topennebula.org</a>,</li> <li>3. <a href="http://www.cloudbus.org/cloudsim/">www.cloudbus.org/cloudsim/</a>, <a href="http://www.eucalyptus.com/">http://www.eucalyptus.com/</a></li> </ol>		

Mapping of CO with PO's														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO 1</b>	1	1	2	2	3	2	2	1	3	1	1	2	2	2
<b>CO 2</b>	2	3	3	3	3	1	2	1	1	1	2	1	2	2
<b>CO 3</b>	2	3	3	3	3	2	3	1	2	1	1	2	1	2
<b>CO 4</b>	2	3	3	3	3	2	3	1	2	1	1	2	2	2
<b>CO 5</b>	2	3	3	3	3	2	3	1	2	1	1	2	2	2
<b>Total</b>	9	13	14	14	15	11	13	5	10	5	6	9	9	10
<b>Scaled Value</b>	2	3	3	3	3	2	3	1	2	1	1	2	2	2
<b>Note:</b>	<b>Total</b>	0		1-5		6-10		11-15						
	<b>Scaled value</b>	0		1		2		3						
	<b>Relation</b>	No		Low		Medium		High						

SEMESTER					:	VI										
COURSE CODE					:	XCSE65										
COURSE NAME					:	MOBILE COMMUNICATION										
PREREQUISITE					:	NETWORKING										
	L	T	P	C			C	P	A		L	T	P	H		
	3	0	0	3			3	0	0		3	0	0	3		
Course Objectives																
<ul style="list-style-type: none"><li>To make the students familiar with fundamentals of mobile communication system</li><li>To understand the multiple access techniques and interference education techniques in mobile communication.</li><li>To have an insight into the various propagation models and the speech coders used in mobile communication.</li></ul>																
Course Outcome: After the completion of the course, students will be able to											Domain C or P or A			Level		
CO1	Understand the fundamentals of mobile communication										Cognitive			Understand		
CO2	Understand the concepts of MAC and Compare various telecommunication systems.										Cognitive			Understand		
CO3	Describe the concepts of various Wireless LAN										Cognitive			Understand		
CO4	Compute the different Routing techniques in mobile network.										Cognitive			Apply		
CO5	Explain different user interface protocols in mobile communications.										Cognitive			Understand		
COURSE CONTENT																
UNIT I		WIRELESS TRANSMISSION												9		
		Introduction to Wireless Networks – Applications – History – Simplified Reference Model – Wireless transmission – Frequencies – Signals – Antennas – Signal propagation – Multiplexing – Modulation – Spread spectrum – Cellular Systems: Frequency Management and Channel Assignment- types of hand-off and their characteristics.														
UNIT II		MAC AND TELECOMMUNICATIONS SYSTEMS												9		
		MAC – Motivation – SDMA, FDMA, TDMA, CDMA –Telecommunication Systems – GSM: Architecture-Location tracking and call setup- Mobility management- Handover- Security- GSM SMS –International roaming for GSM- call recording functions-subscriber and service data management – DECT – TETRA – UMTS – IMT-2000.														
UNIT III		WIRELESS LAN												9		
		Wireless LAN – Infrared Vs Radio transmission – Infrastructure – Adhoc Network – IEEE 802.11WLAN Standards – Architecture – Services– HIPERLAN – Bluetooth Architecture & protocols.														
UNIT IV		Mobile IP/TCP												9		
		Mobile Network Layer – Mobile IP – Dynamic Host Configuration Protocol - Mobile Transport Layer – Traditional TCP – Indirect TCP – Snooping TCP – Mobile TCP – Fast retransmit / Fast recovery – Transmission / Time-out freezing – Selective retransmission – Transaction Oriented TCP.														
UNIT V		WAP/WML												9		
		WAP Model- Mobile Location based services -WAP Gateway –WAP protocols –														

		WAP user agent profile- caching model-wireless bearers for WAP - WML - WML Scripts - WTA – iMode - SyncML.												
										L	T	P	Total	
										45	0	0	45	
TEXT BOOKS														
1. Jochen Schiller, “ Mobile Communication”, 2nd Edition, Pearson Education, 2008. 2. Theodore and S. Rappaport, “Wireless Communications, Principles, Practice”, 2nd Ed PHI, 2002.														
REFERENCE BOOKS														
1. William Stallings, “Wireless Communications and Networks”, 2nd Edition, Pearson Education, 2004 2. C.Siva Ram Murthy and B.S.Manoj, “Adhoc Wireless Networks: Architectures and Protocols”, 2nd Edition, Pearson Education, 2008 3. Vijay. K. Garg, “Wireless Communication and Networking”, Morgan Kaufmann Publishers, 2007.														
Mapping of CO with PO’s														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS01	PS02
CO 1	2	3	2	3	2	1	0	0	0	0	0	1	0	0
CO 2	2	3	2	3	2	1	0	0	0	0	0	1	0	0
CO 3	1	3	3	2	1	1	0	0	0	0	0	1	0	0
CO 4	2	2	2	2	2	1	0	0	0	0	0	1	0	0
CO 5	2	3	3	1	1	1	0	0	0	0	0	1	0	0
Total	9	14	12	11	8	5	0	0	0	0	0	5	0	0
Scaled Value	2	3	3	3	2	1	0	0	0	0	0	1	0	0
Note:														
	Total		0	1-5	6-10	11-15								
	Scaled value		0	1	2	3								
	Relation		No	Low	Medium	High								

SEMESTER		:	VII													
COURSE CODE		:	XCSE71													
COURSE NAME		:	PARALLEL AND DISTRIBUTED ALGORITHMS													
PREREQUISITE		:	COMPUTER NETWORKS													
	L	T	P	C			C	P	A			L	T	P	H	
	3	0	0	3			3	0	0			3	0	0	3	
Course Objectives																
<ul style="list-style-type: none"><li>• To learn about operational procedures of parallel and distributed algorithms.</li><li>• To know about the challenges in parallel and distributed algorithms.</li><li>• To learn about the graph model techniques</li><li>• To understand parallel and distributed communication environments</li></ul>																
Course Outcome: After the completion of the course, students will be able to											Domain		Level			
CO1	Define parallel and distributed algorithms.										Cognitive		Understand			
CO2	Explain the data structures for parallel computing										Cognitive		Understand			
CO3	Explain the paradigms for parallel algorithms										Cognitive		Understand			
CO4	Discuss about the various graph models and its mechanism										Cognitive		Understand			
CO5	Explain about communication in distributed systems.										Cognitive		Remember			
COURSE CONTENT																
UNIT I		Introduction													9	
		Introduction to computers, Parallel computers, parallel processing concepts, High performance computers. Elements of Parallel Computing: Levels of parallelism, Taxonomy of parallel computers, Models for parallel computation, PRAM model, performance of parallel algorithms.														
UNIT II		Data Structures for Parallel Computing													9	
		Arrays and Lists, Linked Lists, Graphs and Trees – Euler and Hamiltonian Graphs, Trees, Graph Traversal, Connectivity, Planar Graphs, Coloring and Independence, Clique covering, Insertion Graph, Chordal Graphs, centrality in Graphs, Domination theory,														
UNIT III		Paradigms for Parallel Algorithms													9	
		Binary Tree paradigm, Growing by Doubling, Pointer Jumping, Divide and Conquer, Partitioning. <b>Simple Algorithms:</b> Scalar product of two Vectors, Matrix Multiplication, Partial sums, Binomial coefficients, Range minima problem.														
UNIT IV		Algorithms for Graph Models													9	
		Tree Algorithms, Graph Algorithms, NC Algorithms for Chordal graphs														
UNIT V		COMMUNICATION IN DISTRIBUTED SYSTEM													9	
		System Model - Inter process Communication - the API for internet protocols - External data representation and Multicast communication. <b>Network virtualization:</b> Overlay networks. <b>Case study:</b> MPI Remote Method Invocation And Objects: Remote Invocation - Introduction - Request-reply protocols - Remote procedure call - Remote method invocation. Case study: Java RMI – Group communication - Publish-subscribe systems - Message queues - Shared memory approaches - Distributed objects - Case study:														



SEMESTER			VII						
COURSE CODE			XCSE72			L	T	P	C
COURSE NAME			INTERNET OF THINGS			3	0	0	3
C	P	A				L	T	P	C
3	0	0				3	0	0	3
PREREQUISITE: NETWORKING									
Course Objectives									
<ul style="list-style-type: none"><li>• To impart knowledge on IoT technologies</li><li>• To teach the platforms available for IoT</li><li>• To provide knowledge on the IoT applications and knows how its implementation</li></ul>									
Course Outcomes						Domain		Level	
CO1	Describe the fundamental technologies of IoT					Cognitive		Understand	
CO2	Explain the service discovery protocols					Cognitive		Understand	
CO3	Discuss the available platforms for IoT Applications and Analytics					Cognitive		Understand	
CO4	Describe the applications of IoT					Cognitive		Understand	
CO5	Demonstrate the Implementation of IoT applications					Cognitive		Understand	
COURSE CONTENTS									
UNIT I		Introduction – Sensors, Actuators & Networking						9Hours	
Introduction; sensors – sensor types; Actuators – Actuator types; Architecture for IoT using Mobile Devices; Mobile Technologies for IoT Ecosystem -5G Technology, Software Defined Networking, Network Functions Virtualization, Ultra Wide Band Technology, Near Field Communication Technology; Energy Harvesting for Power Consumption									
UNIT II		Service Discovery Protocols						9Hours	
Layered Architecture for IoT; Protocol Architecture of IoT; Routing Protocols – IEEE802.15.4, Low-Power Wireless Personal Area Networks, Bluetooth Low Energy, EPC Global, Z-wave, device or service discovery for IoT, Protocols for IoT Service Discovery									
UNIT III		Platforms for IoT Applications and Analytics						9Hours	
The IoT Building Blocks; Machine-to-Machine Application Platforms; The Architecture Building Blocks; Azure IoT Hub; Amazon Web Service IoT Platform; Cisco IoT system ; IBM Watson IoT platform; IoT Data Analytics Platform									
UNIT IV		IoT UseCases						9Hours	
IoT in agriculture, IoT in retail market, Smart lightings, Smart Transportation systems –Electric Vehicles, Smarter Vehicles, Intelligent transport system, Smart Health Care Systems – Clinical care, Remote monitoring									
UNIT V		IoT using Raspberry Pi						9Hours	
Raspberry Pi Setup, networking, hardware basics, controlling hardware, controlling led’s, making user interface to make things on and off, controlling motors, controlling GPIO using a Web Interface, Displaying sensor reading on webpage, Sending sensor data to thing speak									
						L	T	P	Total
						45	0	0	45

<b>TEXT BOOKS</b>														
1. The Internet of Things: Enabling Technologies, Platforms, and Use Cases by Pethuru Raj and Anupama C. Raman (CRC Press), 2017 2. Raspberry Pi Cookbook, 3rd Edition, by Simon Monk Released October 2019 Publisher(s): O'Reilly Media, Inc. ISBN: 9781492043225														
<b>REFERENCE BOOKS</b>														
1. Arshdeep Bahga, Vijay Madiseti, —Internet of Things – A hands-on approach, Universities Press, 2015 2. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocols, Wiley, 2012														
<b>E-REFERENCES</b>														
1. NPTEL Course Introduction to Internet of Things <a href="https://onlinecourses.nptel.ac.in/noc20_cs22/course">https://onlinecourses.nptel.ac.in/noc20_cs22/course</a> 2. Ebooks - <a href="https://www.iotforall.com/ebooks">https://www.iotforall.com/ebooks</a>														

### Mapping of CO with PO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	1	2	3	1	3	3	3	0	0	1	1	0	1	1
CO 2	2	2	3	1	3	3	3	0	0	1	1	0	1	1
CO 3	2	2	3	1	3	3	3	0	0	1	2	1	1	1
CO 4	2	2	3	2	2	3	3	1	0	2	1	0	2	1
CO 5	2	2	3	1	3	3	3	0	0	1	1	0	1	1
Total	11	10	15	6	14	15	15	1	0	6	6	1	6	5
Scaled Value	3	2	3	2	3	3	3	1	0	2	2	1	2	1

1 – 5 → 1,                      6 – 10 → 2,                      11 – 15 → 3  
 0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

Semester		:	VII													
Course Code		:	XCSE73													
Course Name		:	Artificial Intelligence													
Prerequisite		:	Data Structure, Algorithms, Probability													
	L	T	P	C			C	P	A			L	T	P	H	
	3	0	0	3			3	0	0			3	0	0	3	
Course Objectives																
• To introduce problem definition and searching techniques																
• To impart knowledge representation and planning techniques																
• To impart the applications of AI																
Course Outcome: After the completion of the course, students will be able to											Domain		Level			
CO1	Restate a problem and search for solution using uninformed search										Cognitive		Understand			
CO2	relate informed search techniques										Cognitive		Understand			
CO3	Demonstrate different knowledge representation methods with emphasis on logics										Cognitive		Understand			
CO4	Explain planning methods										Cognitive		Understand			
CO5	Relate AI in various real world applications										Cognitive		Understand			
COURSE CONTENT																
UNIT I		PROBLEM SOLVING BY SEARCH													9	
		Introduction to AI, Problem Formulation, Problem Solving as state space search; Production systems; Control strategies- forward and backward chaining; Uninformed Searches: Depth first search, Breadth first search, Depth-limited search, Iterative deepening depth-first search.														
UNIT II		SEARCHING TECHNIQUE													9	
		Informed Heuristic Search Techniques, Hill climbing; Branch and Bound technique; Best first search and A* algorithm; AND/OR Graphs; Problem reduction and AO* algorithm; Constraint Satisfaction problems Game Playing Min Max Search procedure; Alpha-Beta cutoff; Additional Refinements.														
UNIT III		KNOWLEDGE REPRESENTATION													9	
		Introduction to Knowledge Representation; Semantic Networks; Frame Representations, Production Rules, Logics- Propositional Logic, First Order Logic, Inference in First Order Logic, Forward chaining algorithm and Backward Chaining algorithm														

UNIT IV	PLANNING AND DECISION MAKING												9	
	Introduction to Planning, Components of a Planning System, Example for Planning System – Goal Stack Planning, Hierarchical Planning, Non-Linear Planning using Constraints Posting – Sequential Decision Problems, Complex Decision Making													
UNIT V	APPLICATIONS OF AI												9	
	AI in health care (iWatch), AI in Automobile (AutoPilot by Tesla), Banking and Finance (robo-traders by Aidya), AI in surveillance, AI for social media, AI in entertainment, AI in education, AI in gaming, AI in agriculture													
										L	T	P	Total	
										45	0	0	45	
TEXT BOOKS														
1. Philip C. Jackson, Introduction to Artificial Intelligence: Third Edition, Dover Publications (2019).														
2. Elaine Rich, Kevin Knight and Shivashankar B Nair: Artificial Intelligence, Third Edition – McGraw Hill (2011).														
REFERENCE BOOKS														
1. Artificial Intelligence: A Modern Approach, Stuart Russell, Peter Norving, Pearson Education 3rd Edition (2014).														
2. Artificial Intelligence: A New Synthesis, Nils J. Nilsson, Morgan Kaufmann Publishers(2007)														
E-REFERENCES														
1. <a href="https://nptel.ac.in/courses/112/103/112103280/">https://nptel.ac.in/courses/112/103/112103280/</a>														
Mapping of CO with PO's														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS01	PS02
CO 1	3	2	3	3	3	2	1	0	0	1	0	1	3	3
CO 2	3	3	2	2	2	3	1	0	0	1	0	2	3	2
CO 3	2	3	3	3	3	2	1	0	1	1	0	1	3	3
CO 4	2	2	2	2	2	2	0	0	0	1	0	1	3	3
CO 5	3	3	3	3	3	2	1	1	0	1	0	1	3	3
Total	13	13	13	13	13	11	4	1	1	5	0	6	15	14
Scaled Value	3	3	3	3	3	3	1	1	1	1	0	2	3	3
Note:	Total		0	1-5		6-10		11-15						
	Scaled value		0	1		2		3						
	Relation		No	Low		Medium		High						

COURSE CODE	XCSE74	L	T	P	C
COURSE NAME	DIGITAL IMAGE PROCESSING	3	0	0	3
PREREQUISITES	SIGNALS AND SYSTEMS, CALCULUS AND LINEAR ALGEBRA	L	T	P	C
C:P:A= 3:0:0		3	0	0	3
<b>Course Objectives:</b> <ul style="list-style-type: none"><li>To study the image fundamentals and mathematical transforms necessary for image processing.</li><li>To study the image enhancement techniques</li><li>To study image restoration techniques</li><li>To study image segmentation and representation techniques</li><li>To study image compression techniques</li></ul>					
<b>COURSE OUTCOMES</b> <i>The students will be able to</i>		<b>DOMAIN</b>	<b>LEVEL</b>		
CO1	<i>Describe</i> the fundamental principles of image processing and perform basic operations on pixels.	Cognitive	Understand		
CO2	<i>Apply</i> the knowledge of image enhancement techniques.	Cognitive	Apply		
CO3	<i>Apply</i> image restoration techniques in different applications.	Cognitive	Apply		
CO4	<i>Examine</i> image segmentation methods for an application.	Cognitive	Apply		
CO5	<i>Demonstrate</i> various image compression techniques.	Cognitive	Apply		
<b>UNIT I DIGITAL IMAGE FUNDAMENTALS</b>					<b>9</b>
Digital Image – Applications of Digital Image Processing – Fundamental Steps In Digital Image Processing - Components of an Image Processing System –Elements of Visual Perception – Structure of the Human Eye – Luminance – Brightness – Contrast – Mach Band Effect – Color Models – Image Sensing and Acquisition - Image Sampling and Quantization- Some Basic Relationship between Pixels.					
<b>UNIT II IMAGE ENHANCEMENT</b>					<b>10</b>
Basics of Intensity Transformations and Spatial Filtering-Histogram equalization and specification techniques, Fundamentals of Spatial Filtering – Smoothing Spatial Filters – Sharpening Spatial Filters-Combining Spatial Enhancement Methods.					
<b>UNIT III IMAGE RESTORATION</b>					<b>10</b>
Image Restoration - degradation model, Unconstrained restoration - Lagrange multiplier and Constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations.					
<b>UNIT IV IMAGE SEGMENTATION AND MORPHOLOGICAL PROCESSING</b>					<b>10</b>
Pixel based approach – feature threshold – choice of feature - optimum threshold - threshold selection methods – Edge detection, Edge linking -region based segmentation – region growing – region splitting and region merging-Morphological Processing: Erosion and Dilation-Opening and Closing-Some Morphological Algorithms.					
<b>UNIT V IMAGE COMPRESSION</b>					<b>6</b>
Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.					
		<b>LECTURE</b>	<b>TUTORIAL</b>	<b>TOTAL</b>	
		<b>45</b>	<b>0</b>	<b>45</b>	

<b>TEXT BOOKS:</b>														
1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Pearson Education Limited, 2018. 2. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, ISBN-139789332551916,2019.														
<b>REFERENCE BOOKS:</b>														
1. William K. Pratt, "Digital Image Processing", Fourth Edition, John Wiley& Sons, ISBN 0-471-22132-5, 2001. 2. Sid Ahmed M.A., "Image Processing Theory, Algorithm and Architectures", McGraw-Hill, 2010														
<b>E-References:</b>														
9. <a href="https://see.stanford.edu/Course/EE261">https://see.stanford.edu/Course/EE261</a>														
10. <a href="http://nptel.ac.in/video.php?COURSEjectId=117105079">http://nptel.ac.in/video.php?COURSEjectId=117105079</a>														
11. <a href="https://www.youtube.com/watch?v=CVV0TvNK6pk">https://www.youtube.com/watch?v=CVV0TvNK6pk</a>														
12. <a href="https://www.coursera.org">https://www.coursera.org</a>														
13. <a href="https://www.cs.nmt.edu/~ip/lectures.html">https://www.cs.nmt.edu/~ip/lectures.html</a>														
14. <a href="http://www.siue.edu/~sumbaug/439_syl.html">http://www.siue.edu/~sumbaug/439_syl.html</a>														

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	2	0	0	0	0	0	0	1	1	1	2	1	1
CO 2	2	2	1	1	3	1	2	1	2	3	2	2	3	2
CO 3	3	2	1	2	3	1	2	1	2	3	2	2	3	2
CO 4	3	3	2	2	3	1	2	1	2	3	2	2	3	2
CO 5	2	2	1	1	3	1	1	1	0	3	2	2	3	1
	12	11	5	6	14	4	7	4	7	13	9	10	13	8

<b>Note:</b>	<b>Total</b>	0	1-5	6-10	11-15				
	<b>Scaled value</b>	0	1	2	3				
	<b>Relation</b>	No	Low	Medium	High				

<b>SEMESTER</b>		:		<b>VII</b>													
<b>COURSE CODE</b>		:		<b>XCSE75</b>													
<b>COURSE NAME</b>		:		<b>MOBILE APPLICATION DEVELOPMENT</b>													
<b>PREREQUISITE</b>		:		<b>JAVA PROGRAMMING</b>													
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>			<b>C</b>	<b>P</b>	<b>A</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>		
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>			<b>3</b>	<b>0</b>	<b>0</b>			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>		
<b>Course Objectives</b>																	
<ul style="list-style-type: none"><li>To compare the components and structure of a mobile development framework-Android Studio.</li><li>Apply mobile application models/architectures and patterns to the development of a mobile software application.</li><li>To demonstrate advanced Java programming competency by developing a maintainable and efficient cloud based mobile application.</li></ul>																	
<i>Course Outcome: After the completion of the course, students will be able to</i>											<b>Domain C or P or A</b>			<b>Level</b>			
<b>CO1</b>	<i>Describe and understand</i> the mobile operating system and its architecture for basic usage										Cognitive			Understand			
<b>CO2</b>	<i>Describe and understand</i> to carry out a design work including developing a prototype that can be evaluated with a specified user group										Cognitive			Understand			
<b>CO3</b>	<i>Describe and understand</i> the specific requirements, possibilities and challenges when developing for a mobile context.										Cognitive			Understand			
<b>CO4</b>	<i>Understand, Explain and Apply</i> practical skills and knowledge to construct software for a mobile application										Cognitive			Apply			
<b>CO5</b>	<i>Describe and understand</i> the ability to reflect over possibilities and demands in collaborative software development										Cognitive			Understand			
<b>COURSE CONTENT</b>																	
<b>UNIT I</b>		<b>INTRODUCTION TO MOBILE DEVICES</b>														<b>9</b>	
		Mobile devices vs. desktop devices - ARM and Intel Architectures, Power Management, Screen resolution, Touch interfaces, App Store, Google Play, Windows Store, Development environmentsXCode-Android Studio-Visual Studio-Phone GAP. Comparing and Contrasting architectures of all three – Android, iOS and Windows															
<b>UNIT II</b>		<b>INTRODUCTION TO ANDROID</b>														<b>9</b>	
		What is Android? - Setting up development environment -Dalvik Virtual Machine .apk file extension Fundamentals- Android Studio - Installation and Configuration - Simulators. Activities, Services, Broadcast Receivers -Content providers															
<b>UNIT III</b>		<b>BASIC BUILDING BLOCKS</b>														<b>9</b>	
		UI Components - Views & notifications - Components for communication -Intents & Intent Filters - Android API levels (versions version names). First sample Hello World Application- Android Manifest.xml - uses-permission uses-SDK - Resources & R.java - Assets – Layouts Drawable Resources - Activities and Activity lifecycle.															
<b>UNIT IV</b>		<b>ANDROID ACTIVITIES AND UI DESIGN</b>														<b>9</b>	
		Understanding Intent, Activity, Activity Lifecycle and Manifest - Creating Application and new Activities - Expressions and Flow control, Android Manifest - Simple UI -Layouts and Layout properties.															
<b>UNIT V</b>		<b>DATABASE - SOLITE</b>														<b>9</b>	

	Introduction to SQLite – SQLite Open Helper and creating a database - Opening and closing a database - Working with cursors Inserts, updates, and deletes													
										<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>	
										<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>	
<b>REFERENCE BOOKS</b>														
1. Griffiths, D., & Griffiths, D. Head First Android Development. (2015), O’Reilly Media.														
<b>E-REFERENCES</b>														
1. Annuzzi, J., Darcey, L., & Conder, S. Introduction to Android Application Development: Android Essentials. Pearson Education, 2013.														
2. Horstmann, C. S., & Cornell, G. Core Java Volume I--Fundamentals. Pearson Education, 2015														
3. McWherter, J., & Gowell, S. Professional Mobile Application Development. Wiley, 2012.														
<b>IS Codes</b>														
<b>Mapping of CO with PO’s</b>														
	<b>PO1</b>	<b>PO2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO 1</b>	0	1	1	2	2	1	1	0	0	1	1	2	2	2
<b>CO 2</b>	0	2	3	2	1	2	1	1	0	1	1	2	2	2
<b>CO 3</b>	0	2	3	3	2	2	1	1	1	1	1	1	2	2
<b>CO 4</b>	1	2	3	3	2	2	1	1	1	1	1	1	2	2
<b>CO 5</b>	1	2	3	3	2	2	1	1	1	1	3	1	2	2
<b>Total</b>	2	9	13	13	9	9	5	4	3	5	7	7	10	10
<b>Scaled Value</b>	1	2	3	3	2	2	1	1	1	1	2	2	2	2
<b>Note:</b>														
	<b>Total</b>	0		1-5		6-10		11-15						
	<b>Scaled value</b>	0		1		2		3						
	<b>Relation</b>	No		Low		Medium		High						

<b>COURSE CODE</b>		XCSE81	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>		QUEUEING THEORY AND MODELING	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>C:P:A</b>		<b>2.5:0.25:0.25</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>COURSE OUTCOMES</b>			<b>DOMAIN</b>		<b>LEVEL</b>	
<b>CO1</b>	<i>Define</i> discrete and continuous random variables and to <i>Find</i> the expected values and moment generating functions of discrete and continuous distributions.		Cognitive		Understand	
<b>CO2</b>	<i>Find the</i> joint and Marginal distribution and to the correlation and regression. <b>Participate</b> in the class discussion on two dimensional random variable.		Cognitive		Understand	
<b>CO3</b>	<i>State</i> and <i>find</i> stationary process and their properties and <i>Explain</i> Markov and Poisson processes.		Cognitive		Understand	
<b>CO4</b>	<i>Apply</i> the Markovian queueing models. <b>Reproduce</b> the Markovian model.		Cognitive		Understand	
<b>CO5</b>	<i>Demonstrate</i> the Non – Markovian queue models and queueing networks.		Cognitive		Understand	
<b>UNIT I - RANDOM VARIABLES</b>					<b>12</b>	
Discrete and continuous random variables - Moments, Moment Generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.						
<b>UNIT II - TWO DIMENSIONAL RANDOM VARIABLES</b>					<b>12</b>	
Joint distributions – Marginal and conditional distributions – covariance – Correlation and linear regression.						
<b>UNIT III - RANDOM PROCESSES</b>					<b>12</b>	
Classification – Stationary process –Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations –Limiting distributions.						
<b>UNIT IV – QUEUEING THEORY</b>					<b>12</b>	
Markovian queues – Birth and Death processes – Single and multiple server queueing models – Little’s formula - Queues with finite waiting rooms – Finite source models.						
<b>UNIT V - NON-MARKOVIAN QUEUES AND QUEUEING NETWORKS</b>					<b>12</b>	
M/G/1 queue – Pollaczek Khintchine formula - M/D/1 and M/Ek/1 as special cases –Series queues.						
	<b>LECTURE</b>	<b>TUTORIAL</b>	<b>PRACTICAL</b>	<b>TOTAL</b>		
<b>HOURS</b>	30	30	0	60		
<b>TEXT BOOKS</b>						
1. Veerarajan .T, Probability, “Statistics and Random Processes”, Tata McGraw Hill,3rd edition, 2008. (Unit – I, II, III) 2. Kandasamy.P, Thilagavathy.K, Gunavathy.K, “Probability,Statistics and Queueing Theory”, S.Chand & Company Ltd, 2004. (Unit – IV, V)						
<b>REFERENCES</b>						
1. Gupta .S.C and Kapoor .V.K, “Fundamentals of Mathematical Statistics”, 11th extensively revised edition, Sultan Chand & Sons, 2007. 2. Allen, A.O., “Probability, Statistics and Queueing Theory with Computer Applications”, Elsevier, 2nd edition, (2005). 3. Taha, H.A., “Operations Research”, Pearson Education”, Asia, 8th edition, (2007). 4. Trivedi, K.S., “Probability and Statistics with Reliability, Queueing and Computer Science Applications”, John Wiley and Sons, 2nd edition, (2002). 5. Hwei Hsu, “Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes”, Tata McGraw Hill edition, New Delhi, (2004).						

## E REFERENCES

[www.nptel.ac.in](http://www.nptel.ac.in)

1. Advanced Engineering Mathematics Prof. Somesh Kumar, Department of Mathematics, Indian Institute of Technology, Kharagpur.

### Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	0	0	1	0	0	0	0	2	0	1	0	0
CO2	3	2	0	0	1	0	0	0	0	2	0	1	0	0
CO3	3	2	0	0	1	0	0	0	0	2	0	1	0	0
CO4	3	2	0	0	1	0	0	0	0	2	0	1	0	0
CO5	3	2	0	0	1	0	0	0	0	2	0	1	0	0
Total	15	10	0	0	5	0	0	0	0	10	0	5	0	0

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

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

<b>COURSE CODE</b>			<b>XCSE82</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>			<b>ADHOC AND SENSOR NETWORKS</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>3</b>	<b>0</b>	<b>0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE</b>		<b>NETWORKING</b>					
<b>Course Objectives</b>							
To make the students familiar with fundamentals of Adhoc and Sensor Networks and its application.							
<b>Course Outcomes</b>				<b>Domain</b>	<b>Level</b>		
<b>CO1</b>	Describe the design issues in ad hoc and sensor networks.			Cognitive	Understand		
<b>CO2</b>	Describe and distinguish the different types of MAC protocols.			Cognitive	Remember		
<b>CO3</b>	Describe the different types of adhoc routing protocols.			Cognitive	Understand		
<b>CO4</b>	Explain the TCP issues in adhoc networks.			Cognitive	Understand		
<b>CO5</b>	Describe the architecture and protocols of wireless sensor networks.			Cognitive	Remember		
<b>COURSE CONTENTS</b>							
<b>UNIT I</b>		<b>INTRODUCTION</b>					<b>9 Hours</b>
Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.							
<b>UNIT II</b>		<b>MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS</b>					<b>9 Hours</b>
Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols-Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11							
<b>UNIT III</b>		<b>ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS</b>					<b>9 Hours</b>
Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions- TCP over Ad hoc wireless Networks.							
<b>UNIT IV</b>		<b>WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS</b>					<b>9 Hours</b>
Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies - MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA – Mobile TCP – Fast retransmit / Fast recovery – Transmission / Time-out freezing – Selective retransmission – Transaction Oriented TCP.							

UNIT V	WSN ROUTING, LOCALIZATION & QOS				9 Hours		
Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization Transport Layer issues.							
				L	T	P	Total
				45	0	0	45
TEXT BOOKS							
C. Siva Ram Murthy, and B. S. Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols “, Prentice Hall Professional Technical Reference, 2014.							
REFERENCE BOOKS							
1. Carlos De Moraes Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.							
2. Feng Zhao and Leonides Guibas, “Wireless Sensor Networks”, Elsevier Publication – 2002.							
3. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005							
4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, and Applications”, John Wiley, 2007.							
5. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003							
E REFERENCES							
1. <a href="https://nptel.ac.in/courses/106/105/106105160/">https://nptel.ac.in/courses/106/105/106105160/</a>							
2. <a href="https://lecturenotes.in/subject/396/adhoc-and-sensor-network-asn">https://lecturenotes.in/subject/396/adhoc-and-sensor-network-asn</a>							

### Mapping of CO with PO's

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO 1</b>	2	3	2	3	2	1	1	0	2	1	0	2	3	2
<b>CO 2</b>	2	3	2	3	2	1	0	0	2	1	0	1	3	2
<b>CO 3</b>	2	3	3	2	1	1	0	0	1	1	0	2	3	2
<b>CO 4</b>	3	2	2	2	2	2	0	0	1	1	0	1	3	3
<b>CO 5</b>	2	3	3	1	1	1	0	0	1	2	0	1	3	2
<b>Total</b>	11	14	12	11	8	6	1	0	7	6	0	7	15	11
<b>Scaled Value</b>	3	3	3	3	2	2	1	0	2	2	0	2	3	3

1 – 5 → 1,                      6 – 10 → 2,                      11 – 15 → 3  
0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

<b>COURSE CODE</b>			<b>XCSE83</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>COURSE NAME</b>			<b>INFORMATION RETRIEVAL</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>C</b>	<b>P</b>	<b>A</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>
<b>3.0</b>	<b>0.0</b>	<b>0.0</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>COURSE OUTCOMES</b>				<b>DOMAI N</b>	<b>LEVEL</b>		
<b>CO1</b>	<i>Define</i> and Explain document and query structure.			Cognitive	Remember		
<b>CO2</b>	<i>Explain, Develop</i> and <i>Estimate</i> query matching and text analysis.			Cognitive	Understand		
<b>CO3</b>	<i>Explain</i> and <i>Measure</i> information retrieval performances.			Cognitive	Understand		
<b>CO4</b>	<i>Explain</i> and <i>Estimate</i> performance improvement measures.			Cognitive	Apply		
<b>CO5</b>	<i>Explain</i> web search, crawling and link analysis.			Cognitive	Understand		
<b>UNIT I</b>		<b>DOCUMENT AND QUERY STRUCTURE</b>					<b>9</b>
Overview: Abstraction – Information System – Measures. Documents and Query Forms: document – data structures – document Surrogates – vocabulary control – structure of data – data compression – text documents – images and sounds. Query Structures: Matching criteria – Boolean queries – vector queries – extended boolean queries – fuzzy queries – probabilistic queries – natural language queries – information retrieval and database systems.							
<b>UNIT II</b>		<b>QUERY MATCHING AND TEXT ANALYSIS</b>					<b>9</b>
Matching Process: Relevance and similarity measures – Boolean based matching – vector based matching – missing terms and term relationship – probabilistic matching – fuzzy matching – proximity matching – effects of weighting – effects of scaling – data fusion. Text Analysis: Indexing – Matrix representation – term extraction and analysis – term association – lexical measures of term significance – document analysis – document similarity – stop lists – stemming.							
<b>UNIT III</b>		<b>PERFORMANCE MEASURES</b>					<b>6</b>
Binary versus N-ary measures – precision and recall – user-oriented measures – average precision and recall – operating curves and single measures – expected search length.							
<b>UNIT IV</b>		<b>PERFORMANCE IMPROVEMENT TECHNIQUES</b>					<b>12</b>
Relevance feedback and query expansion - Text classification and Naive Bayes: Text classification problem - Naive Bayes text classification - The Bernoulli model - Properties of Naive Bayes - Feature selection - Vector space classification: Document representations and measures of relatedness in vector spaces - Rocchio classification - k nearest neighbor - Linear versus nonlinear classifiers - Classification with more than two classes - The bias-variance tradeoff - Flat clustering: Clustering in information retrieval - Problem statement - Evaluation of clustering - K-means - Model-based clustering - Hierarchical clustering: Hierarchical agglomerative clustering - Single-link and complete-link clustering - Group-average agglomerative clustering - Centroid clustering - Optimality of HAC - Divisive clustering - Cluster labeling - Implementation notes.							
<b>UNIT V</b>		<b>WEB SEARCH AND LINK ANALYSIS</b>					<b>9</b>
Web search basics: Background and history - Web characteristics - Advertising as the economic model - The search user experience - Index size and estimation - Near-duplicates and shingling - Web crawling and indexes: Overview - Crawling - Distributing indexes - Connectivity servers - Link analysis: The Web as a graph - PageRank - Hubs and Authorities.							

	LECTURE	TOTAL
	45	45
<b>TEXT BOOKS</b>		
1. Robert R. Korfage, <i>Information storage and retrieval</i> , John Wiley & Sons, Inc., New York, NY, 1997 2. C. Manning, P. Raghavan, and H. Schütze, <i>Introduction to Information Retrieval</i> , Cambridge University Press, 2008		
<b>REFERENCE BOOKS</b>		
1. Baeza-Yates and B. Ribeiro-Neto. <i>Modern Information. Retrieval. Addison Wesley</i> , 1999 2. Gerard Salton and M. J. McGill. <i>Introduction to Modern Information Retrieval. McGraw Hill Book Co., New York, 1983.</i> 3. C. J. van RIJSBERGEN, <i>The geometry of information retrieval</i> , Cambridge University Press, 2004		

### Mapping of COs with POs:

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

Note:

<b>Total</b>	0	1-5	6-10	11-15
<b>Scaled value</b>	0	1	2	3
<b>Relation</b>	No	Low	Medium	High

SEMESTER					:	VIII										
COURSE CODE					:	XCSE84										
COURSE NAME					:	CRYPTOGRAPHY AND NETWORK SECURITY										
PREREQUISITE					:	-										
	L	T	P	C			C	P	A			L	T	P	H	
	3	0	0	3			3	0	0			3	0	0	3	
Course Objectives																
• To understand the concepts of network vulnerabilities and the ways to protect threats																
• To understand various cryptography algorithms																
• To understand the real time security issues on web security.																
Course Outcome: After the completion of the course, students will be able to											Domain C or P or A		Level			
CO1	Explain the common network vulnerabilities and attacks										Cognitive		Understand			
CO2	Describe and compare the security of different cryptographic algorithm										Cognitive		Understand			
CO3	Identify the possible threats to each mechanism and ways to protect against these threats										Cognitive		Analyze			
CO4	Outline the requirements and mechanisms for identification and authentication.										Cognitive		Understand			
CO5	Explain the requirements of real-time communication security and issues related to the security of web services.										Cognitive		Understand			
COURSE CONTENT																
UNIT I		INTRODUCTION													9	
		Basic concepts: confidentiality, integrity, availability, security policies, security mechanisms, assurance, Malicious Software ,Denial-of-Service Attacks, Intrusion Detection, Intrusion Prevention														
UNIT II		CRYPTOGRAPHY													9	
		Simple DES – Differential cryptoanalysis – DES – Modes of operation – Triple DES – AES – RC4 – RSA – Attacks – Primality test – factoring.														
UNIT III		SECURITY MECHANISM													9	
		Discrete Logarithms – Computing discrete logs – Diffie-Hellman key exchange – ElGamal Public key cryptosystems – Hash functions – Secure Hash – Birthday attacks - MD5 – Digital signatures – RSA – ElGamal – DSA														
UNIT IV		NETWORK SECURITY													9	
		Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP, S/MIME – IP security – Web Security – SSL, TLS, SET.														
UNIT V		SYSTEM SECURITY													9	
		System security – Intruders – Malicious software – viruses – Firewalls – Security Standards.														
												L	T	P	Total	

									45	0	0	45		
TEXT BOOKS														
1. Network Security (2nd edition) by Kaufman, Perlman, and Speciner. ISBN 0130460192.														
2. Wade Trappe, Lawrence C Washington, “Introduction to Cryptography with coding theory”, 2nd ed, Pearson, 2007.														
3. William Stallings, “Cryptography and Network security Principles and Practices”, Pearson/PHI, 4th ed, 2006.														
4. Computer Security: Principles and Practice (2nd Edition), Pearson Press														
REFERENCE BOOKS														
1. W. Mao, “Modern Cryptography – Theory and Practice”, Pearson Education, Second Edition, 2007.														
2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing Third Edition – Prentice Hall of India, 2006														
E-REFERENCES														
1. NPTEL, Cryptography and Network Security, Dr.Debdeep Mukhopadhyay, IIT Kharagpur														
Mapping of CO with PO’s														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	2	3	0	1	2	0	1	0	1	1	1	2
CO 2	3	2	1	3	0	1	2	0	1	0	1	1	2	2
CO 3	3	2	1	3	0	1	2	1	1	0	1	1	2	2
CO 4	3	2	1	2	0	1	2	1	1	0	1	1	2	2
CO 5	3	2	1	2	0	1	2	0	1	0	1	1	2	1
Total	15	10	6	13	0	5	10	2	5	0	5	5	11	11
Scaled Value	3	2	2	3	0	1	2	1	1	0	1	1	3	3
Note:	Total		0		1-5		6-10		11-15					
	Scaled value		0		1		2		3					
	Relation		No		Low		Medium		High					

<b>Semester</b>		:		<b>VIII</b>													
<b>Course Code</b>		:		<b>XCSE85</b>													
<b>Course Name</b>		:		<b>Project Management</b>													
<b>Prerequisite</b>		:		<b>Software Engineering</b>													
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>			<b>C</b>	<b>P</b>	<b>A</b>			<b>L</b>	<b>T</b>	<b>P</b>	<b>H</b>		
	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>			<b>3</b>	<b>0</b>	<b>0</b>			<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>		
<b>Course Objectives</b>																	
<ul style="list-style-type: none"><li>To make the students, to understand the Software Project Planning and Evaluation techniques.</li></ul>																	
Course Outcome: After the completion of the course, students will be able to											<b>Domain C or P or A</b>		<b>Level</b>				
CO1	To describe the Project Management principles while developing software.										Cognitive		Understand				
CO2	To describe the obtain adequate knowledge about software process models and software effort estimation techniques.										Cognitive		Understand				
CO3	To explain the Estimate the risks involved in various project activities.										Cognitive		Understand				
CO4	To describe the checkpoints, project reporting structure, project progress and tracking mechanisms using project management principles.										Cognitive		Understand				
CO5	To describe the gain extensive knowledge about the basic project management concepts, framework and the process models.										Cognitive		Understand				
<b>COURSE CONTENT</b>																	
<b>UNIT I</b>		<b>Project Evaluation and Project Planning</b>													<b>9</b>		
		Importance of Software Project Management – Activities – Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.															
<b>UNIT II</b>		<b>Project life cycle and effort estimation</b>													<b>9</b>		
		Software process and Process Models – Choice of Process models – Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points – COCOMO II – a Parametric Productivity Model.															
<b>UNIT III</b>		<b>Activity planning and risk management</b>													<b>9</b>		
		Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning –Risk Management – – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules.															

UNIT IV	<b>Project Management and Control</b>					<b>9</b>
	Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management.					
UNIT V	<b>Staffing in Software Projects</b>					<b>9</b>
	Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.					
			<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
			<b>45</b>	<b>0</b>	<b>0</b>	<b>45</b>
<b>TEXT BOOKS</b>						
1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.						
<b>REFERENCE BOOKS</b>						
1. Robert K. Wysocki —Effective Software Project Management – Wiley Publication, 2011.						
2. Walker Royce: —Software Project Management- Addison-Wesley, 1998.						
3. Gopalaswamy Ramesh, —Managing Global Software Projects – McGraw Hill Education (India), Fourteenth Reprint 2013						
<b>E REFERENCES</b>						
<a href="https://nptel.ac.in/courses/110/104/110104073/">https://nptel.ac.in/courses/110/104/110104073/</a>						

<b>Mapping of CO with PO's</b>														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	1	1	1	1	1	0	0	1	1	1	0	1	1	1
CO 2	1	2	1	1	1	0	0	1	1	2	0	1	1	1
CO 3	2	2	2	2	1	0	0	1	1	1	0	1	1	1
CO 4	1	2	2	2	2	0	0	1	1	2	0	1	2	1
CO 5	2	2	3	2	2	0	0	1	1	2	0	1	2	1
Total	7	9	9	8	7	0	0	5	5	8	0	5	7	5
Scaled Value	2	3	2	2	2	0	0	1	1	2	0	1	2	1
<b>Note:</b>	<b>Total</b>	0		1-5		6-10		11-15						
	<b>Scaled value</b>	0		1		2		3						
	<b>Relation</b>	No		Low		Medium		High						

Course Code		:	XCSOE1														
Course Name		:	Web Design I														
Prerequisite		:	Nil														
	L	T	P	C			C	P	A			L	T	P	H		
	3	0	0	3			3	0	0			3	0	0	3		
Course Objectives																	
<ul style="list-style-type: none"><li>To define the basics of web design and HTML</li></ul>																	
<ul style="list-style-type: none"><li>To learn the basic concepts of CSS</li></ul>																	
<ul style="list-style-type: none"><li>To make own webpage and how to host website</li></ul>																	
Course Outcome: After the completion of the course, students will be able to										Domain		Level					
CO1	Define the basics in web design										Cognitive		Understand				
CO2	Visualize the basic concept of HTML										Cognitive		Understand				
CO3	Recognize the elements of HTML										Cognitive		Apply				
CO4	Introduce the basic concepts of CSS										Cognitive		Apply				
CO5	Develop the concept of web publishing										Cognitive		Analyze				
COURSE CONTENT																	
UNIT I		BASICS IN WEB DESIGN													9		
		Brief History of Internet-What is World Wide Web-Why create a web site-Web Standards-Audience requirement.															
UNIT II		INTRODUCTION TO HTML													9		
		What is HTML-HTML Documents-Basic structure of an HTML document-Creating an HTML document-Mark up Tags-Heading-Paragraphs-Line Breaks-HTML Tags.															
UNIT III		ELEMENTS OF HTML													9		
		Introduction to elements of HTML-Working with Text-Working with Lists, Tables and Frames-Working with Hyperlinks, Images and Multimedia-Working with Forms and controls.															
UNIT IV		INTRODUCTION TO CASCADING STYLE SHEETS													9		
		Concepts of CSS-Creating Style Sheet-CSS Properties-CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects-Working with Lists and tables-Class Id and Class-Box Model(Introduction, Border Properties, Padding Properties, Margin Properties)-CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector)-CSS Color-Creating page Layout and Site Designs.															
UNIT V		INTRODUCTION TO WEB PUBLISHING OR HOSTING													9		
		Creating the Web Site-Saving the site-Working on the web site-Creating web site structure-Creating Titles for web pages-Themes-Publishing web sites.															
											L	T	P	Total			
											45	0	0	45			

<b>TEXT BOOKS</b>														
1. Eric Meyer on CSS: Mastering the Language of Web Design. 2003. Eric Meyer. New Riders Publishing. 2. A. Thomas Powell, “The complete reference – HTML and CSS (Covers HTML5)” McGraw Hill, Fifth Edition, 2010. 3. Kogent Learning Solutions Inc. “HTML5 Black Book: Covers CSS3, JavaScript, XML, XHTML, Ajax, PHP and JQuery – Black Book”, Dreamtech Press, 2011. 4. Kogent Learning Solutions Inc “Web Technologies: HTML, JavaScript, PHP, Java, JSP, ASP.Net, XML and AJAX, Black Book”, Dreamtech Press, 2009.														
<b>REFERENCE BOOKS</b>														
1. Build Your Own Web Site the Right Way Using HTML & CSS, 2nd Edition by Ian Lloyd. 2. The Essential Guide to CSS and HTML Web Design (Essentials) by Craig Grannel.														
<b>E-REFERENCES</b>														
1. <a href="https://freevideolectures.com/course/3140/internet-technologies">https://freevideolectures.com/course/3140/internet-technologies</a>														
<b>Mapping of CO with PO's</b>														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	3	3	3	3	0	2	2	1	0	0	2	3	3
CO 2	3	3	3	3	3	0	2	2	1	0	0	2	3	3
CO 3	2	2	2	3	3	0	2	2	1	0	0	1	2	2
CO 4	2	2	2	2	0	0	0	0	0	0	0	0	0	0
CO 5	3	2	3	3	3	0	2	2	2	0	0	0	3	2
Total	13	12	13	14	12	0	8	8	5	0	0	5	11	10
Scaled Value	3	3	3	3	3	0	2	2	1	0	0	1	3	2
Note:														
	Total	0		1-5		6-10		11-15						
	Scaled value	0		1		2		3						
	Relation	No		Low		Medium		High						

Course Code				:	XCSOE2												
Course Name				:	Web Design - II												
Prerequisite				:	NIL												
	L	T	P	C			C	P	A			L	T	P	H		
	3	0	0	3			3	0	0			3	0	0	3		
Course Objectives																	
<ul style="list-style-type: none"><li>• To gain the web design knowledge, skills and project-based creativity is needed for entry into web design and development careers.</li></ul>																	
<ul style="list-style-type: none"><li>• To learn to work as freelancers in web design or prepare to become employed at a website design firm.</li></ul>																	
Course Outcome: After the completion of the course, students will be able to										Domain or P or A		C	Level				
CO1	Describe the Advanced CSS for Webdesign.										Cognitive			Remember			
CO2	Describe and Explain the XML.										Cognitive			Understand			
CO3	Describe the Java Script for Web design.										Cognitive			Remember			
CO4	Describe and Explain jQuery										Cognitive			Understand			
CO5	Explain the Bootstrap and describe Canva										Cognitive			Understand			
COURSE CONTENT																	
UNIT I		INTRODUCTION TO ADVANCED CSS													9		
		CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align,Pseudo class, Navigation Bar, Image Sprites, Attribute sector)- CSS Color- Creating Page Layout and Site designs															
UNIT II		INTRODUCTION TO XML													9		
		XML : Introduction, XML and SGML, Design goals of XML, Application of XML: Document Application, Data Application, XML Software : Browsers, Editors, Parsers, Processor, XML tags, Structure of XML documents, XML element tags, Element markup, Attribute markup, HTML document, adding scripts, Data types in XML , XML Namespaces, working with text and font : Working with DTD : Introduction, HTML and DTD, Benefits of the DTD, Structure of DTD, Declarations of variable in DTD : Element name, Occurrence indicators, Connectors.															
UNIT III		INTRODUCTION TO JAVA SCRIPT													9		
		Basics, Variables, Operators, Data Types etc, Control Structures - If-Else, while, Do while, For Loops, Logic Building Sessions, Creating Functions  Inbuilt Functions - Dates, Strings, Numerics etc, Arrays, Objects, Events, Statements, Regular Expressions, HTML DOM and Alert box															
UNIT IV		INTRODUCTION TO jQUERY													9		
		Basics, Effects, DOM Parsing, Form Validations, Events, functions, Creating Images,															

	Dynamic CSS Programming, Hide and show element													
UNIT V	INTRODUCTION TO BOOTSTRAP and CANVA												9	
	Basics, Grid system, Tables, Images, Button, Font Awesome & Glyphic Icons, Pagination, Forms, Menu & Navigation Bar, Bootstrap Modals - (pop ups), Creating Responsive Websites in Bootstrap, Creating Website Images using CANVA													
										L	T	P	Total	
									45	0	0	45		
TEXT BOOKS														
1. Steven M. Schafer,”HTML, XHTML, and CSS Bible”, Wiley India,fifth Edition,2010.														
2. John Duckett “Beginning HTML, XHTML, CSS, and JavaScript”, Wiley India														
REFERENCE BOOKS														
1. HTML5 Black Box Covers Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery) 2Ed. January 2016 by <u>DT Editorial Services</u>														
E-REFERENCES														
1. <a href="https://freevidelectures.com/course/3140/internet-technologies">https://freevidelectures.com/course/3140/internet-technologies</a>														
Mapping of CO with PO’s														
	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	1	3	3	1	3	0	1	0	2	2	2	2	2	1
CO 2	2	3	3	2	3	0	1	0	3	2	1	1	3	2
CO 3	2	3	3	2	3	0	1	0	3	2	1	1	3	2
CO 4	3	2	2	1	2	0	1	0	3	2	0	1	3	2
CO 5	3	2	2	1	2	0	1	0	3	2	0	1	3	2
Total	11	13	13	7	13	0	5	0	14	10	4	6	14	9
Scaled Value	3	3	3	2	3	0	1	0	3	2	1	2	3	2
Note:	Total		0		1-5		6-10		11-15					
	Scaled value		0		1		2		3					
	Relation		No		Low		Medium		High					

Course Code		:	XCSOE3													
Course Name		:	Multimedia Design and Development													
Prerequisite		:	NIL													
	L	T	P	C			C	P	A			L	T	P	H	
	3	0	0	3			3	0	0			3	0	0	3	
Course Objectives																
• To impart the basic concepts of elements of multimedia.																
• To understand basic concepts about multimedia and its applications																
• Effectively incorporate image, audio, animation, and text media into a multimedia																
Course Outcome: After the completion of the course, students will be able to										Domain		Level				
CO1	Describe the multimedia applications.									Cognitive		Remember				
CO2	Describe and Explain the Digital Media.									Cognitive		Understand				
CO3	Describe the graphics and image.									Cognitive		Remember				
CO4	Describe and Explain audio technology									Cognitive		Understand				
CO5	Explain the video technology and describe animation									Cognitive		Understand				
COURSE CONTENT																
UNIT I		INTRODUCTION													9	
		Multimedia- Elements of Multimedia, Features of Multimedia system, Applications of Multimedia. Multimedia file formats. Multimedia applications in business, education and entertainment.														
UNIT II		DIGITAL MEDIA													9	
		Media and Digital Technologies- Digital Environment, New and Old Media, Communication revolution and new media – Networked society – New media and public sphere. Analogue and digital information, Digital Media- characteristics of digital media, Forms of digital media. Emerging Technologies- Virtual reality, augment reality, Mixed reality.														
UNIT III		GRAPHICS AND IMAGE													9	
		Color Models, Image file formats and how and where it is used, Morphing, Kinematics, tweening, Motion capture, modeling, special effects, and compositing, Video Conferencing, Web Streaming, Video Streaming, Internet Telephony.														
UNIT IV		SOUND / AUDIO													9	
		Perception of sound, hearing sensitivity, frequency range, sound- wavelength, the speed of sound. measuring the sound, musical sounds, noise signal, dynamic range, pitch, harmonics-equalization reverberation time, Sound isolation and room acoustics- treatments- studio layout –room dimensions. The Basic set-up of														

	recording system; The production chain and responsibilities. Microphones types - phantom power, noise, choosing the right mike; Mixing console; Input devices; Output devices; Audio formats and Publishing				
UNIT V	VIDEO AND ANIMATION	9			
	Different types of video camera including Handy Camera, Tape Formats, Analog Editing, Editing Equipment's and Consoles, Video Signal, Video Format, Video Lights - Types and Functions. Uses of Tripod- Types. Clapboard- Usage. Light meter. Other Useful Accessories. History of animation: Types of animation Principles of animation,2D and 3D animation				
		L	T	P	Total
		45	0	0	45

#### TEXT BOOKS

1. Paranjay Guha Thakurta, Dr.M.ManzoorAlam, R Mansukhani , R Mnaqlcolm, Mohd Z Haque "Media in our Globalizing World", Genuine Publications and Media Pvt Ltd; First Edition edition, 2015.
2. Rajan Parekh "Principle of Multimedia" Tata McGraw Hill, New delhi, 2006
3. Multimedia Systems Design by Prabhat K. Andleigh and Kiran Thakrar-PHI publication ,1996
4. Multimedia systems by John F. Koegal Buford-Pearson Education. 2009
5. Fundamentals of multimedia by Ze-Nian Li and MS Drew. PHI EEE edition.2008.

#### REFERENCE BOOKS

1. Jane Kirtley "Media Law Handbook", Bureau of International Information Programs United States Department of State, Published in 2010.

#### E-REFERENCES

2. [.http://www.humber.ca/program/multimedia-design-and-development](http://www.humber.ca/program/multimedia-design-and-development)

#### Mapping of CO with PO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO 1</b>	1	3	3	1	3	0	0	0	2	2	2	2	2	1
<b>CO 2</b>	2	3	3	2	3	0	0	0	3	3	1	1	3	2
<b>CO 3</b>	2	3	3	2	3	0	0	0	3	3	1	1	3	2
<b>CO 4</b>	3	2	2	1	2	0	0	0	3	3	1	1	3	2
<b>CO 5</b>	3	2	2	1	2	0	0	0	3	3	1	1	3	2
<b>Total</b>	11	13	13	7	13	0	0	0	14	14	6	6	14	9
<b>Scaled Value</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>2</b>

**Note:**

<b>Total</b>	0	1-5	6-10	11-15				
<b>Scaled value</b>	0	1	2	3				
<b>Relation</b>	No	Low	Medium	High				

Course Code		:	XCSE4														
Course Name		:	Computer Installation and Troubleshooting														
Prerequisite		:	Nil														
	L	T	P	C			C	P	A			L	T	P	H		
	3	0	0	3			3	0	0			3	0	0	3		
Course Objectives																	
<ul style="list-style-type: none"><li>Describe the functions of components in a computer system</li></ul>																	
<ul style="list-style-type: none"><li>Perform installation, configuration, and upgrading of various peripheral devices</li></ul>																	
<ul style="list-style-type: none"><li>Diagnose and troubleshoot problems with microcomputer peripherals.</li></ul>																	
Course Outcome: After the completion of the course, students will be able to										Domain			Level				
CO1	Define and describe the mother board and Memories of computer system										Cognitive			Understand			
CO2	Define and explain the basics and functionalities of keyboard, mouse and monitor. Identify the I/O ports and understand the functionalities of SMPS.										Cognitive			Understand			
CO3	Organize the computer components, Explain the motherboard installation and operating system installation.										Cognitive			Understand			
CO4	Analyze the problems in Personal computer, diagnose problem, identify the repair tools and troubleshoot the problems.										Cognitive			Analyze			
CO5	Describe the Installation of Peripheral devices to the system, Analyze and troubleshoot the problem.										Cognitive			Analyze			
COURSE CONTENT																	
UNIT I		UNDERSTANDING PC HARDWARE AND MEMORY DEVICES													9		
		Understanding PC hardware-PC systems, PC configurations, the mother board-functional block diagram, Processors, support chips, I/O expansion slots. Memory and Memory devices-BIOS, on board memory, floppy disk drive and controller, hard disk drive and controller, CD-ROM disc and drive.															
UNIT II		I/O DEVICES, I/O PORTS AND SMPS													9		
		Keyboard-operation, interface and signals, Mouse-operation, connection signals, Monitor-video basics, Creating the screen image, display adapter standards, monitor type and resolution, I/O ports-serial, parallel, USB, Fire wire, game ports, SMPS-principles of operation, signals provided, power supply form factors, power audit.															
UNIT III		PC INSTALLATION													9		
		PC installation, installing the motherboard, devices installation, operating system installation.															
UNIT IV		PC TROUBLE SHOOTING													9		
		PC trouble shooting approach to troubleshooting, General diagnostic techniques, diagnose trouble shooting and repair tools, and troubleshooting the															

	systems, troubleshooting the system drives.													
UNIT V	PERIPHERAL INSTALLATION AND TROUBLE SHOOTING												9	
	Peripheral installation and troubleshooting-Dot matrix printer, laser printer, ink jet printer, modem, trouble prevention-environment, power supply.													
										L	T	P	Total	
										45	0	0	45	
TEXT BOOKS														
1. M.Radakrishnnan, D.Balasubramanian,” Computer Installation And Trouble Shooting”,ISTE-Learning materials center, April 2001,ISBN 81- 88057-00-2.														
REFERENCE BOOKS														
1. Balasubramanian, “Computer Installation And Servicing” Tata McGraw Hill Education Private Limited,2 <sup>nd</sup> Edition.														
2. Mark Minasi “The Complete PC Upgrade & Maintenance Guide” John Wiley & Sons; 11th Revised edition.														
E-REFERENCES														
<a href="https://archive.nptel.ac.in/courses/106/106/106106092/">https://archive.nptel.ac.in/courses/106/106/106106092/</a>														
Mapping of CO with PO’s														
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PS01	PS02
CO 1	3	0	2	0	0	0	0	0	1	1	0	1	2	2
CO 2	0	1	2	0	0	0	0	0	0	1	0	1	2	2
CO 3	2	1	1	2	3	1	0	0	0	1	0	0	2	1
CO 4	2	1	2	0	3	0	0	0	0	1	0	1	2	1
CO 5	2	1	0	0	2	0	0	0	1	1	0	2	2	1
Total	9	4	7	2	8	1	0	0	2	5	0	5	10	7
Scaled Value	2	1	2	1	3	3	0	0	1	1	0	1	2	1

Note:	Total	0	1-5	6-10	11-15				
	Scaled value	0	1	2	3				
	Relation	No	Low	Medium	High				