PERIYAR MANIAMMAI UNIVERSITY

(Under Sec. 3 of UGC Act, 1956) • NAAC Accredited

think • innovate • transform

B. TECH. COMPUTER SCIENCE AND ENGINEERING

(4 Year Programme)

REGULATION 2017

UNIVERSITY MISSION

UM1: Offering well balanced programmes with scholarly faculty and state-of-art Facilities to impart high level of knowledge.

UM2: Providing student - centered education and foster their growth in critical thinking, creativity, Entrepreneurship, problem solving and collaborative work.

UM3: Involving progressive and meaningful research with concern for sustainable development.

UM4: Enabling the students to acquire the skills for global competencies.

UM5: Inculcating Universal values, Self-respect, Gender equality, Dignity and Ethics.

DEPARTMENT VISION

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

DEPARTMENT MISSION

DM1 To offer UG, PG, Ph.D. program me with state of art facilities in the field of Computer Science and Engineering

DM2 To prepare the students become globally competent by enhancing their skills to work in IT Industries and R & D organizations

DM3 To prepare the students with good ethical attitude and an ability to relate engineering issues to broader social context

DM4 To promote significant research in cutting edge Information Communication technologies with environmental consciousness

Table 1: Mapping of University Mission with Department Mission

	DM1	DM2	DM3	DM4	Total
UM1	**3**	**2**			**5**
UM2	**2**	**3**	**1**	**1**	**7**
UM3				**3**	**3**
UM4		**3**	**2**		**5**
UM5		**1**	**3**	**1**	**5**

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

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1 : Graduates will attain the expertise of analyzing and specifying the requirements for any computing system as well as capable of modeling, designing, implementing and verifying a computing system to meet specified requirements using contemporary tools

PEO2 : Graduates will possess diversified professional skills for successful career.

PEO3 : Graduates of the programme will have the competencies for communicating, planning, coordinating, organizing, decision making and leading a team

PEO4 : Graduates of the programme will have knowledge of professional, interpersonal and ethical responsibility and will contribute to society through active research.

Table 2: Mapping Department Missions and Programme Educational Objectives

	PEO1	PEO2	PEO3	PEO4	Total
DM1	**3**			**2**	**5**
DM2		**3**	**3**		**6**
DM3			**2**	**3**	**5**
DM4	**1**			**3**	**3**
Total	**4**	**3**	**5**	**8**	

GRADUATE ATTRIBUTES

1. **Knowledge base for Engineering:** Demonstrate competence in mathematics, natural sciences, engineering fundamentals and specialized engineering knowledge appropriate to the programme.
2. **Analytical Skills:** Identify, formulate, analyze and solve diverse engineering problems.

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

PROGRAMME OUTCOMES

	Programme Outcome
PO1	An ability to apply knowledge of computing and mathematics appropriate to the discipline.
PO2	An ability to analyze a problem, interpret data, and define the computing system requirements which would be appropriate to the solution.
PO3	An ability to design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
PO4	An ability to apply creativity in the design of systems which would help to investigate the complex problem and provide software solution.
PO5	an ability to use the computing techniques, skills, and modern system tools necessary for practice as a CSE professional
PO6	an ability to analyze the local and global impact of computing on individuals, organizations, and society
PO7	an ability to develop and use the software systems within realistic constraints environmental, health and safety, manufacturability, and sustainability considerations
PO8	An ability in an understanding of professional, ethical, legal, security and social issues and responsibilities
PO9	Ann ability to function effectively on teams and individually to accomplish a common goal
PO10	An ability to communicate effectively with a range of audiences by written and oral
PO11	Ability to plan, organize and follow best practices and standards so that the project is completed as successfully by meeting performance, quality at CMM level, budget and time
PO12	An ability to engage in Lifelong learning and continuing professional development

PROGRAMME SPECIFIC OUTCOMES

PSO1 Ability to employ latest computer languages, environments and Plat forms for solving problems in the areas of emerging Communication technologies.

PSO2 Ability to use knowledge in data analytics and mining for industrial problems

Table 3: GA versus PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
GA1	3	2	2	1	1	1	1	2	1	2	1	1	3	3
GA2	2	3	2	2	1	0	0	0	0	1	0	0	3	3
GA3	2	2	3	1	3	1	1	0	0	2	0	0	3	3
GA4	2	2	1	3	2	1	0	0	0	1	0	0	2	3
GA5	1	1	1	1	3	2	0	0	3	0	0	0	3	3
GA6	1	1	1	1	1	3	1	3	0	0	0	0	1	1
GA7	0	0	0	1	2	0	3	1	0	1	0	0	1	1
GA8	0	0	0	0	0	0	1	3	1	1	1	1	2	2
GA9	0	0	0	0	0	0	0	2	3	2	1	1	2	2
GA 10	0	0	0	0	0	0	0	2	2	3	1	1	2	2
GA 11	0	0	0	0	0	0	0	1	1	2	3	0	1	1
GA 12	1	1	1	1	1	1	1	1	1	1	1	3	3	3

Table 4: Mapping Department Program Outcomes and Programme Educational

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	Total
PEO1	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**3**	**3**	**27**
PEO2	**3**	**2**	**2**	**2**	**2**	**2**	**2**	**0**	**0**	**0**	**1**	**1**	**2**	**2**	**21**
PEO3	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**3**	**3**	**2**	**1**	**0**	**0**	**10**
PEO4	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**2**	**0**	**0**	**2**	**1**	**0**	**0**	**9**
Total	**7**	**6**	**6**	**6**	**5**	**3**	**3**	**4**	**3**	**4**	**6**	**4**	**5**	**5**	**0**

Objectives

CURRICULUM REGULATION -2017

SEMESTER I						
COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**C**	**H**
XMA101	Algebra, Differential calculus and their application	3	1	0	4	5
XCP102	Computer Programming (Lab included)	3	0	1	4	5
XBW103	Mechanical and Civil Engineering Systems (workshop practice included)	3	1	1	5	7
XAC104	Applied Chemistry (Lab included)	3	1	1	5	7
XGS105	Study Skills and Language Laboratory	1	0	0	1	3(1L+2SS)
XUM106	Human Ethics, Values, Rights and Gender Equality (plus 2 hours self-study)	1	0	0	1	3
	Total				**20**	**30**
SEMESTER II						
XMA201	Calculus and Laplace Transforms	3	1	0	4	5
XEM202	Engineering Mechanics	3	1	0	4	5
XBW203	Electrical and Electronics Engineering Systems (BEE Lab included)	3	1	1	5	7

XAP204	Applied Physics(Physics Lab included)	3	1	1	5	7
XEG205	Engineering Graphics	2	0	1	3	4
XGS206	Speech Communication	1	0	0	1	3
	Total			**22**		**31**
SEMESTER III						
XDM301	Discrete Mathematics	3	1	0	4	5
XCS302	Data Communication	3	1	0	4	5
XCS303	Digital systems and Microprocessor(Lab Included)	3	0	1	4	5
XCS304	Data Structures (Lab included)	3	1	1	5	7
XMS305	Material Science	3	0	0	3	3
XEP306	Entrepreneurship Development	2	0	0	2	3
XGS307	Interpersonal Communication	0	0	0	0	2
XCS308	In-plant Training –I	-	-	-	1	
	Total			**23**		**30**
SEMESTER IV						
XMA401	Probability and Queuing Theory	3	0	0	3	3
XCS402	Computer Architecture	3	0	0	3	3
XCS403	Object Oriented Programming with	3	0	1	4	5

	Java					
XCS404	Operating Systems(Lab Included)	3	1	1	5	7
XCS405	Design and Analysis of Algorithms	3	1	0	4	5
XEE406	Economics for Engineers	3	0	0	3	3
XGS407	Technical communication	1	0	0	1	3
	Extracurricular Activities-NCC/NSS/YRC/RRC/Sports	-	-	-	-	-
	Total			**23**		**29**
SEMESTER V						
XMA501	Numerical Methods	2	1	0	3	4
XCS502	Theory of Computation	2	1	0	3	4
XCS503	Database Management Systems(Lab Included)	3	0	1	4	5
XCS504	Web Technology and Mobile Application Development (Lab Included)	3	1	1	5	7
XCSE5*	Professional Elective-I (with Tutorial)	2	1	0	3	4
XTQ506	Total Quality Management	3	0	0	3	3
XGS507	Business Communication	1	0	0	1	3
XCS508	In-plant Training –II				1	
	Total			**23**		**30**

SEMESTER VI						
X**OE*	Open Elective –I	3	0	0	3	3
XCS602	Data Warehousing and Data Mining	3	0	0	3	3
XCS603	Cloud Computing (Lab Included)	3	0	1	4	5
XCS604	Principles of Compiler Design(Lab Included)	3	1	1	5	7
XCS605	Digital Signal Processing	3	1	0	4	5
XCSE6*	Professional Elective- II	3	0	0	3	3
XES607	Environmental Studies (Non Credit Course)	0	0	0	0	3
XGS608	Academic Writing (Non credit course)	0	0	0	0	2
	Total			**22**		**31**
SEMESTER VII						
X**OE*	Open Elective II	3	0	0	3	3
XCS702	Software Engineering (Lab Included)	3	0	1	4	5
XCS703	Data Analytics (Lab Included)	3	1	1	5	7
XCSE7*	Professional Elective-III	3	0	0	3	3
XCSE7*	Professional Elective-IV	3	0	0	3	3
XUMC706	Cyber Security	3	0	0	3	3

XCS707	Project phase – I	0	0	2	2	4
XGS708	Career Development Skills(Non Credit Course)	0	0	0	0	1
XCS709	In-Plant Training – III	-	-	-	2	-
	Total			**25**		**29**
SEMESTER VIII						
X**OE*	Open Elective III	3	0	0	3	3
XCSE8*	Professional Elective-V	3	0	0	3	3
XCSE8*	Professional Elective – VI	3	0	0	3	3
XCS804	Project Phase II	0	0	12	12	24
	Total			**21**		**33**

OPEN ELECTIVES

Open Elective Code No.	Course Title	L	T	P	C	H
XCSOE1	Free Open Source Software	3	0	0	3	3
XCSOE2	Web Design	3	0	0	3	3
XCSOE3	Object Oriented Programming	3	0	0	3	3
XCSOE4	Multimedia design and Development	3	0	0	3	3
XCSOE5	Digital Marketing	3	0	0	3	3

LIST OF PROFESSIONAL ELECTIVES

V SEMESTER

* Elective Code No.	Course Title	L	T	P	C	H
XCSE51	Cryptography and Network Security	2	1	0	3	4
XCSE52	Distributed Computing	2	1	0	3	4
XCSE53	Graph Theory	2	1	0	3	4
XCSE54	Computer Graphics and Multimedia	2	1	0	3	4

VI SEMESTER

Elective Code No.	Course Title	L	T	P	C	H
XCSE61	Advanced Databases	3	0	0	3	3
XCSE62	Mobile Computing and Communication	3	0	0	3	3
XCSE63	Internet of Things	3	0	0	3	3
XCSE64	Programming with Python	3	0	0	3	3

VII SEMESTER

Elective Code No.	Course Title	L	T	P	C	H
XCSE71	Network Measurements and Testing	3	0	0	3	3
XCSE72	Software Testing	3	0	0	3	3
XCSE73	XML and Web Services	3	0	0	3	3
XCSE74	Disaster Management	3	0	0	3	3
XCSE75	Ethical Hacking	3	0	0	3	3
XCSE76	Artificial Intelligence and Expert System	3	0	0	3	3
XCSE77	Design and Analysis of Parallel algorithms	3	0	0	3	3
XCSE78	Game Theory	3	0	0	3	3

VIII SEMESTER

Elective Code No	Course Title	L	T	P	C	H
XCSE81	Digital Image Processing	3	0	0	3	3
XCSE82	Information Retrieval	3	0	0	3	3
XCSE83	Wireless Sensor Networks	3	0	0	3	3
XCSE84	Embedded Systems and PLC	3	0	0	3	3
XCSE85	Service Oriented Architecture	3	0	0	3	3
XCSE86	Advanced Computer Architecture	3	0	0	3	3
XCSE87	Soft Computing	3	0	0	3	3

TOTAL CREDIT: 179

LIST OF ONE CREDIT COURSES

* Elective Code No.	Course Title	L	T	P	C	H
XCSXXX	Web Design using JOOMLA Content Management System	.5	0	.5	1	2
XCSXXX	R Programming	.5	0	.5	1	2
XCSXXX	Internet of Things	.5	0	.5	1	2

SYLLABUS

SEMESTER I

COURSE CODE	**XMA101**	**L**	**T**	**P**	**C**
COURSE NAME	**ALGEBRA, DIFFERENTIAL CALCULUS AND THEIR APPLICATIONS**	**3**	**1**	**0**	**4**
		L	**T**	**P**	**H**
C:P:A	**3:0:0**	**3**	**2**	**0**	**5**

COURSE OUTCOMES		**Domain**	**Level**
CO1	***Explain*** the Properties of Eigen values and eigen vectors of the matrices, ***Make Use of*** orthogonal and similarity transformation and ***Construct*** the quadratic form to Canonical form.	Cognitive	Understanding Apply
CO2	***Define*** and ***Find*** the radius and circle of curvature in Cartesian and polar coordinates and to ***Explain*** evolutes and envelopes.	Cognitive	Remembering Understanding
CO3	***Explain*** the convergence of series of positive terms, alternating series, and power series using tests of convergence	Cognitive	Understanding

CO4	***Find*** total and partial derivatives, Taylor series expansions of functions and the extremum of functions and their applications.	Cognitive	Remembering
CO5	***Solve*** the linear equations of second and higher order with constant and variable coefficients and simultaneous first order differential equations and to ***Apply*** Method of variation of parameters to ***Solve*** the differential equation.	Cognitive	Apply

UNIT I MATRICES	**15**
Eigen values and Eigenvectors of a real matrix –Properties of Eigen values and Eigen vectors – Cayley-Hamilton theorem (excluding proof) - Similarity transformation (Concept only) – Orthogonal matrix - Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to Canonical form by Orthogonal transformation.	
UNIT II GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS	**15**
Curvature – Cartesian and polar co-ordinates – Centre and radius of curvature – Circle of curvature – Involutes and evolutes – Envelopes – Properties of envelopes and evolutes.	
UNIT III INFINITE SERIES	**15**
Sequences – Convergence of series – General properties – Series of positive terms – Tests of convergence (Comparison test, Integral test, Comparison of ratios and D'Alembert's ratio test – Statement of theorems and problems only) – Alternating series – Series of positive and negative terms – Absolute and conditional convergence – Power Series – Convergence of exponential, logarithmic and Binomial Series (Simple problems only) .	
UNIT IV FUNCTIONS OF SEVERAL VARIABLES	**15**
Functions of two variables – Partial derivatives – Total differentiation – Taylor's expansion – Maxima and Minima – Constrained maxima and minima – Lagrange's Multiplier method – Jacobian Determinants.	
UNIT V ORDINARY DIFFERENTIAL EQUATIONS AND APPLICATIONS	**15**

Linear equations of second and higher order with constant and variable coefficients (Euler's and Legendre's equations) – Simultaneous first order linear equations with constant coefficients – Method of variation of parameters - Applications to electrical circuit problems.

	LECTURE	TUTORIAL	TOTAL
	45	30	75

TEXT BOOKS:

1. Grewal, B.S. Higher Engineering Mathematics, 40th Edition, Khanna Publication, Delhi, 2007.
2. Kreyszig, E, Advanced Engineering Mathematics, Eighth Edition, John Wiley and Son(Asia) Ltd, Singapore, 2001.

REFERENCES

1. Bali N.P and Narayana Iyengar, Engineering Mathematics, Laxmi Publications (P) Ltd, New Delhi, 2003.
2. Veerarajan T, Engineering Mathematics Fourth Edition, Tata – McGraw Hill Publishing Company Ltd, New Delhi, 2005.
3. Kandasamy P., Thilagavathy K, and Gunavathy K, Engineering Mathematics Volume I, II and III, S. Chand & Co, New Delhi, 2005.
4. Venkataraman M. K, Engineering Mathematics, Volume I and II Revised enlarge Fourth Edition, The National Publishing Company, Chennai, 2004.

E REFERENCES

1. www.nptel.ac.in
2. Advanced Engineering Mathematics Prof. Pratima Panigrahi, Department of Mathematics Indian Institute of Technology, Kharagpur.

CO Vs GA Mapping:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO 1	3	2			2					1		2
CO 2	3	1								1		1
CO 3	3	1								1		1
CO 4	3	2								1		1
CO 5	3	2			1					1		2
	15	8	0	0	3	0	0	0	0	5	0	7

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

COURSE CODE	XCP102	L	T	P	C
COURSE NAME	COMPUTER PROGRAMMING	3	0	1	4
C:P:A	3:1:0				
		L	T	P	H
		3	0	2	5

Course Outcomes		Domain	Level
CO1	***Define*** programming fundamentals and ***Solve*** simple programs using I/O statements.	Cognitive Psychomotor	Remember Guided Response
CO2	***Define*** syntax and ***write simple programs*** using control structures and arrays	Cognitive Psychomotor	Remember Guided Response
CO3	***Explain*** and ***write simple programs*** using functions and pointers	Cognitive Psychomotor	Understand Guided Response
CO4	***Explain*** and ***write simple programs*** using structures and unions	Cognitive Psychomotor	Understand Guided Response
CO5	***Explain*** and ***write simple programs*** using files and ***Build*** simple projects	Cognitive Psychomotor	Understand Guided Response

UNIT I PROGRAMMING FUNDAMENTALS AND INPUT /OUTPUT STATEMENTS **9 + 6**

Theory

Program – Flowchart – Pseudo code – Software – Introduction to C language – Character set – Tokens: Identifiers, Keywords, Constants, and Operators – sample program structure -Header files – Data Types - Output statements – Input statements.

Practical

1. Program to display a simple picture using dots.
2. Program for addition of two numbers
3. Program to swap two numbers
4. Program to solve any mathematical formula.

UNIT II CONTROL STRUCTURE AND ARRAYS **9 + 6**

Theory

Control Structures – Conditional Control statements: Branching, Looping - Unconditional control structures: switch, break, continue, go to statements – Arrays: One

Dimensional Array – Declaration – Initialization – Accessing Array Elements – Searching – Sorting – Two Dimensional arrays - Declaration – Initialization – Matrix Operations – Multi Dimensional Arrays - Declaration – Initialization. Storage classes: auto – extern – static. Strings: Basic operations on strings.

Practical

1. Program to find greatest of 3 numbers using Branching Statements
2. Program to display divisible numbers between n1 and n2 using Looping Statement
3. Program to remove duplicate element in an array.
4. Program to perform string operations.

UNIT III FUNCTIONS AND POINTERS	**9 + 6**

Theory

Functions: Built in functions – User Defined Functions - Parameter passing methods - Passing arrays to functions – Recursion - Programs using arrays and functions. Pointers - Pointer declaration - Address operator - Pointer expressions & pointer arithmetic - Pointers and function - Call by value - Call by Reference - Pointer to arrays - Pointers and structures - Pointers on pointer.

Practical

1. Program to find factorial of a given number using four function types.
2. Programs using Recursion
3. Programs using Pointers

UNIT IV STRUCTURES AND UNIONS	**9 + 6**

Theory

Structures and Unions - Giving values to members - Initializing structure - Functions and structures - Passing structure to elements to functions - Passing entire function to functions - Arrays of structure - Structure within a structure and Union.

Practical

1. Program to read and display student mark sheet Structures with variables
2. Program to read and display student marks of a class using Structures with arrays
3. Program to create linked list using Structures with pointers

UNIT V FILES	**9 + 6**

Theory

File management in C - File operation functions in C - Defining and opening a file -

Closing a file - The getw and putw functions - The fprintf & fscanf functions - fseek function – Files and Structures.

Practical

1. Program for copying contents of one file to another file.
2. Program using files using structure with pointer

	LECTURE	PRACTICAL	TOTAL
	45	**30**	**75**

TEXT BOOKS

1. Byron Gottfried, "Programming with C", III Edition, (Indian Adapted Edition), TMH publications, 2010
2. Yeshwant Kanethker, “Let us C”, BPB Publications, 2008

REFERENCES

1. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. (2005).
2. Behrouz A. Forouzan and Richard. F. Gilberg, "A Structured Programming Approach Using C", II Edition, Brooks–Cole Thomson Learning Publications, 2001.
3. Johnson baugh R. and Kalin M., “Applications Programming in ANSI C”, III Edition, Pearson Education India, 2003.
4. https://iitbombayx.in/courses/IITBombayX/BMWCS101.1x/2015_T1/courseware

Mapping of COs with GAs:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	3	2			2							2
CO2	3	2			2							2
CO3	3	2	1	2	2							2
CO4	3	2	1	2	2							2
CO5	3	2	1		2			1			2	2
Scaled to 0,1,2,3 scale	**3**	**2**	**1**	**1**	**2**			**1**			**1**	**2**

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

COURSE CODE	XBW103	L	T	P	C
COURSE NAME	MECHANICAL AND CIVIL ENGINEERING SYSTEMS	3	1	1	5
		L	T	P	H
C:P:A	3:1:0	3	2	2	7

COURSE OUTCOMES		Domain	Level
CO1	***Define and explain*** the working principles of the various boilers, turbines and engines	Cognitive and Psychomotor	Remember Set
CO2	***Select and identify*** the various machine elements and metrology instruments	Cognitive and Psychomotor	Remember Perception
CO3	***Choose and distinguish*** the various manufacturing processes	Cognitive and Psychomotor	Remember Perception
CO4	***List and describe*** the classification of surveying and construction materials	Cognitive and Psychomotor	Remember Perception
CO5	***Name and explain*** the components and construction of civil structures	Cognitive and Psychomotor	Remember Set

UNIT I BASICS OF THERMAL AND ENERGY SYSTEMS **9+6+6**

Introduction to Mechanical Engineering – Streams – Thermal, Design, and Manufacturing Conventional and non conventional sources of energy – Heat energy – Modes of heat transfer – Working principles of Boilers and Turbines – Classification of IC Engines – 4 stroke and 2 stroke engines – Petrol and diesel engines – Performance and heat balance – Working principles of hydel, steam and nuclear power plants.

Practical:

1. Load test on high speed single cylinder diesel engine with eddy current .

2.Load test on 4 stroke single cylinder petrol engine with electrical loading .

UNIT II FUNDAMENTALS OF MACHINE ELEMENTS AND MEASUREMENTS **9+6+6**

Engineering materials – Machine elements – fasteners and support systems – Belt drives – Types – Velocity ratio and Length of belt – Gear drives – Types – Velocity ratio.

Principle of measurements – Accuracy – Precision – Errors – Measuring instruments – Scale – Vernier Caliper – Micrometer – Slip gauges – Spirit level.

Practical:

1.Comparison and measurements using vernier caliper and micrometer

2.Calibration of vernier using slip gauge

3. Calibration of micrometer using slip gauge

UNIT III ELEMENTS OF MANUFACTURING	**9+6+6**

Manufacturing processes – Classification – Principles of metal forming – forging, moulding, casting – Principles of metal joining – welding, soldering and brazing.

Machining – turning, drilling, milling and grinding – Machining time and material removal rate.

Practical:

1.Plain turning

2.Drilling and tapping

3. Square butt joint

4. Tee joint

UNIT IV SURVEYING AND CONSTRUCTION MATERIALS	**9+6+6**

Surveying: Definition – Survey Instruments – Classification of Survey – Linear and Angular Measurements – Measurement of area – Illustrative Examples.

Construction Materials: Bricks – Stones – Timber – Steel – Cement – Sand – Aggregates – Concrete

Practical:

1.Determination of area and plotting of a given site by chain surveying

2.Running (or) Transverse using compass

UNIT V COMPONENTS AND CONSTRUCTION OF CIVIL STRUCTURES	**9+6+6**

Substructure: Bearing capacity - Types of Foundation – Application – Requirement of good foundations.

Superstructure: Brick masonry – Types of bond – Flooring – Beams – Columns – Lintels – Roofing – Doors and windows fittings – Introduction to bridges and dams – Building drawing

Practical:

1.Half lap joint

2.Mortise and tenon joint.

	LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
	45	**30**	**30**	**105**

TEXT BOOKS:

1. Dr. P.K. Srividhya, P. Pandiyaraj, S. Balamurugan, “Basic Civil and Mechanical Engineering”, PMU Publications, Vallam, 2013.
2. Dr. B.C.Punmia, Ashok Kumar Jain, “Basic Civil Engineering”, Laxmi Publications, New Delhi, 2003.
3. Dr. B.C.Punmia, “Surveying – Volume I”, Laxmi Publications, New Delhi, 2005

REFERENCE BOOKS

1. Venugopal K., Basic Mechanical Engineering, Anuradha Publications, Kumbakonam, 2007.
2. Shanmugam G. and Palanichamy M. S.,"Basic Civil and Mechanical Engineering", Tata Mc Graw Hill Publishing Co., New Delhi, 3rd Edition, 2009.

E RESOURCES

1.http://nptel.iitm.ac.in/courses

2.http://www.intechopen.com/books

Mapping of CO’s with GA’s:

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

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

COURSE CODE	XAC104	L	T	P	C
COURSE NAME	APPLIED CHEMISTRY	3	1	1	5
PREREQUISITES		L	T	P	H
C:P:A	2.8:0.8:0.4	3	2	2	7

COURSE OUTCOMES		Domain	Level
CO1	***Identify*** and describe the various water quality parameters and methods to purify water in contest with boilers and domestics usage.	Cognitive & Psychomotor	Understand, Perception
CO2	***Explain*** the fundamental principles of electrochemical reactions, its applications in redox reactions and calculate the different electrochemical processes.	Cognitive & Psychomotor	Create, Set
CO3	***Interpret*** the types of corrosion, ***use*** *and* ***measure*** its control by various methods including protective techniques.	Cognitive, Psychomotor &Affective	Apply, Mechanism, Receiving
CO4	***Describe***, ***Illustrate*** and ***Discuss*** the generation of energy in batteries, nuclear reactors, solar cells, fuel cells and anaerobic digestion.	Cognitive & Affective	Remember, Analyze, Respond
CO5	***Apply*** and ***measure*** the different types of spectral techniques for quantitative chemical analysis and ***list*** nanomaterial*'s* for various engineering processes.	Cognitive	Apply, Mechanism

Theory Part

UNIT - I WATER TECHNOLOGY	7 + 8 +9

Sources and types of water – water quality parameters – BIS and ISO specifications- hardness: types and estimation of hardness (problems) - alkalinity: types and estimation (problems) – boiler feed water – requirements – disadvantages of using hard water in boilers – internal treatment, external treatment – demineralization process – desalination using reverse osmosis – domestic water treatment - Effluent treatment processes in industries

UNIT - II ELECTROCHEMISTRY	8+5 +15

Basic concepts of conductance – Kohlraush's law and conductometric titrations –

electrode potentials– Nernst equation: derivation and problems - reversible and irreversible cells – electrolytic and electrochemical cells – emf and its measurements - types of electrodes-reference electrodes - primary and secondary - glass electrode - determination of pH using quinhydrone and glass electrodes - electrochemical series and its applications - Galvanic cells and concentration cells - potentiometric titrations - redox titrations.

UNIT – III	**CORROSION AND PROTECTIVE COATINGS**	**9 + 4 +3**

Corrosion- causes- types-chemical, electrochemical corrosion (galvanic, differential aeration), corrosion in electronic devices, corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method.

Protective coatings: paints- constituents and functions - electroplating of copper and gold, Electroless plating - Distinction between electroplating and electroless plating, advantages of electroless plating, electroless plating of nickel and copper on PCB.

UNIT –IV	**ENERGY STORAGE DEVICES AND NUCLEAR ENERGY**	**12 + 7**

Energy storage devices – Batteries: Types – primary (dry cell, alkaline cells) and secondary (lead acid, Ni-Cd and Lithium ion batteries) - Super capacitors – Fuel cells- Hydrogen-Oxygen fuel cell- Solar cells .

Nuclear energy: nuclear fission and fusion –chain reaction and its characteristics – nuclear energy and calculations (problems) – atom bomb –Nuclear reactor- light water nuclear power plant – breeder reactor- Weapon of mass destruction- nuclear, radiological, chemical and biological weapons. Disarmament - National and International Cooperation- Chemical Weapon Convention (CWC), Peaceful Uses of Chemistry. Bio fuels: biomethanation- anaerobic digestion process, biomass: sources and harness of energy.

UNIT –V	**SPECTROSCOPY AND NANOCHEMISTRY**	**9 +6 +3**

Electromagnetic spectrum - Lambert law and Beer-Lambert's law (derivation and problems) – molecular spectroscopy -UV- visible spectroscopy: electronic transitions - chromophores and auxochromes – instrumentation (block diagram) - applications – IR spectroscopy: principle – fundamental modes of vibrations – calculations of vibrational frequency – IR spectrophotometer instrumentation (block diagram) – applications of IR spectroscopy.

Nano chemistry - Basics - distinction between molecules, nanoparticles and bulk

materials; size-dependent properties. Nanoparticles: Nanocluster, nanorod, nanotube and nanowire. Synthesis; properties and applications of nano materials-Buckminster fullerenes, CNT‟S (Single walled carbon nano tubes and Multi-walled carbon tubes)-Graphene- advantages and applications.

TEXT BOOKS

1. Jain and Jain, “A Text book of Engineering Chemistry”, Dhanapatrai Publications, New Delhi, 2011.
2. Gadag and Nityananda Shetty , “Engineering Chemistry”, I.K International Publishing House Pvt. Ltd, 2010.
3. P. Atkins, J.D. Paula, “Physical Chemistry” , Oxford University Press, 2009.
4. S. S. Dara, S. S. Umare, “A Text Book of Engineering Chemistry”, S. Chand Publishing, 2011
5. C.P. Poole and F.J. Owens, “Introduction to Nanotechnology”, , Wiley, New Delhi 2007.

REFERENCES

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

E RESOURCES - MOOCs:

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

Laboratory Part **30 hrs**

1. Determination of total hardness, temporary and permanent hardness of water by EDTA method.
2. Determination of alkalinity of water sample.
3. Determination of chloride content of water sample by Argentometric method.
4. Conductometric titration of a strong acid with a strong base.
5. Determination of strength of hydrochloric acid by pH metric method.
6. Conductometric precipitation titration using barium chloride and sodiumsulphate.
7. Determination of strength of iron by potentiometric method using dichromate.
8. Potentiometric acid-base titration using quinhydrone electrode.
9. Corrosion inhibition efficiency by weight loss method.
10. Estimation of iron by colorimetric method.

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.
2. Garland, C. W.; Nibler, J. W.; Shoemaker, D. P. “Experiments in Physical

Chemistry", 8th Ed.; McGraw-Hill: New York, 2003.

3. Sirajunnisa.A., Sundaranayagi.S.,Krishna.,Rajangam.R.,Gomathi.S., "Applied Chemistry Lab Manual", Department of Chemistry, PMU Press, Thanjavur, 2016.

E-RESOURCES - MOOCs:

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

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

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

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	**30**	**30**	**105**

Mapping of CO's with GA's:

	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA 10	GA 11	GA 12
CO1	3	3	3			1	2	1	1	1		2
CO2	2	1	0			1		1	1			1
CO3	3	3	3	2	2	1	2		1	1		1
CO4	3	3	2	2	2	1	2		1	1		1
CO5	2	2	1	1	1	1	1	1	1			1
Total	**13**	**12**	**9**	**5**	**5**	**5**	**7**	**3**	**5**	**3**		**6**
Scaled to 0,1,2,3 scale	**3**	**3**	**2**	**1**	**1**	**1**	**2**	**1**	**1**	**1**		**2**

COURSE CODE	XGS105	L	T	P	SS	C
COURSE NAME	Study Skills and Language Laboratory	1	0	0	2	1
PREREQUISITES		L	T	P	SS	H
C:P:A	1.8:0.6:0.6	1	0	0	2	3

COURSE OUTCOMES		Domain	Level
CO1	***Identify*** different strategies of reading and writing skills.	Cognitive	Remembering
CO2	***Revise*** **the** library skills in their learning process.	Affective	Internalize
CO3	***Apply*** different techniques to various types of material such as a novel, newspaper, poem, drama and other reading papers.	Cognitive	Apply
CO4	***Use*** visual aids to support verbal matters into language discourse.	Cognitive	Understand
CO5	***Prepares*** to face the written exam with confidence and without any fear or tension.	Cognitive & Psychomotor	Understand, Guided Response

UNIT I INTRODUCTION TO STUDY SKILLS	**5**
Learning Skills and Strategies of Learning; Cognitive Study skills and physical study skills, Library skills (How to use Library), familiarization of library facilities by the librarian; familiarization of basic cataloguing techniques, how to ransack the library etc.	
UNIT II REFERENCE SKILLS	**5**
How to use the library facilities for research and to write assignments; how to find out reference books, articles, journals and other e- learning materials; how to use a dictionary and thesaurus.	
UNIT III READING RELATED STUDY SKILLS	**5**
Process of reading, various types of reading materials and varied reading techniques; familiarization to materials written by various authors; features of scientific writing and familiarization to scientific writing by renowned authors; note making skills	
UNIT IV WRITING RELATED STUDY SKILLS	**5**
Process of writing, characteristics of writing, discourse analysis, use of visual aids, and note making and note taking skills	
UNIT V EXAM PREPARATION SKILLS	**5**
Anxiety reduction skills; familiarization with various types of exam/evaluation techniques etc.	
LANGUAGE LAB (Practical)	
SOUNDS OF ENGLISH LANGUAGE; Vowels, consonants, diphthongs, word stress, sentence stress, intonation patterns, connected speech etc	**5**
VOCABULARY BUILDING Grammar, synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, idioms and phrases.	**5**

READING COMPREHENSION Reading for facts, meanings from context, scanning, skimming, inferring meaning, and critical reading. Active listening, listening for comprehension etc.			**10**
	LECTURE	**SELF STUDY**	**TOTAL**
	15	**30**	**45**

TEXT BOOKS

Appropriate Chapters/Units from the following textbooks

1. V.R. Narayanaswamy ,Strengthen Your Writing Orient Longman, 2000
2. Ghosh, R N; Inthira, S R, A Course in written English: Oxford Univ Press, New Delhi, 2001
3. Jaya Sasikumar, Champa Tickoo, Writing With A Purpose, Published by Oxford University Press, 2000
4. Freeman, Sarah: Study Strategies. New Delhi: Oxford University Press, 1979
5. Paul Gunashekar M.L. Tickoo, Reading for Meaning, S. Chand & Company Ltd., 2000
6. Bernard Hartley, Peter Viney, Streamline English: Departures, Oxford English, 1990.
7. Bernard Hartley, Peter Viney, Streamline English: Destinations, Oxford: Oxford University Press, 1992.
8. Bernard Hartley, Peter Viney, Streamline English Directions, Oxford University Press 1982.

REFERENCE BOOKS

1. Jaya Sasikumar, Champa Tickoo, Writing With A Purpose, Oxford University Press 2001.
   Freeman, Sarah*:* Study Strategies*. New Delhi: Oxford University Press,* 1979.
2. Reading for Meaning, Paul Gunashekar M.L. Tickoo, Published by S. Chand & Company Ltd. Sultan Chand & Company**,** 2000
3. Susan Fawcett Evergreen: A Guide to Writing with Readings Paperback – January 4, 2013.

Mapping of COs with GAs:

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

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

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

COURSE CODE	XUM 106	L	T	P		C
COURSE NAME	HUMAN ETHICS, VALUES, RIGHTS AND GENDER EQUALITY	1	0	0		1
PREREQUISITES		L	T	P	SS	H
C:P:A	2.7:0:0.3	1	0	0	2	3

COURSE OUTCOMES		Domain	Level
CO1	***Relate*** and ***Interpret*** the human ethics and human relationships	Cognitive	Remember, Understanding
CO2	***Explain*** and ***Apply*** gender issues, equality and violence against women	Cognitive	Understanding, Applying
CO3	***Classify*** and ***Develop*** the identify of human rights and their violations	Cognitive & Affective	Analyzing Receiving
CO4	***Classify*** and ***Dissect*** necessity of human rights and report on violations.	Cognitive	Understanding, Analyze
CO5	***List*** and **respond** to family values, universal brotherhood, fight against corruption by common man and good governance.	Cognitive & Affective	Remember, (Respond)

UNIT I HUMAN ETHICS AND VALUES	7
Human Ethics and values - Understanding of oneself and others- Basic instincts, motives and needs- Social service, Social Justice, Dignity and worth, Harmony in human relationship: Family and Society, Integrity and Competence, Caring and Sharing, Honesty and Courage, Valuing Time, Co-operation, Commitment, Sympathy and Empathy, Self-Confidence and Personality- Living in harmony at various levels.	
UNIT II GENDER EQUALITY	**9**
Gender Equality - Gender Vs Sex -, Concepts, definition, Gender equity, equality, and empowerment. Status of Women in India Social, Economical, Education, Health, Employment, HDI, GDI, GEM. Contributions of Dr.B.R. Ambethkar, Thanthai Periyar and Phule to Women Empowerment.	
UNIT III WOMEN ISSUES AND CHALLENGES	**9**
Women Issues and Challenges- Female Infanticide, Female foeticide, Violence against women, Domestic violence, Sexual Harassment, Trafficking, Access to education, Marriage. Remedial Measures – Acts related to women: Political Right, Property Rights, and Rights to Education, Medical Termination of Pregnancy Act, and Dowry Prohibition Act.	
UNIT IV HUMAN RIGHTS	**9**
Human Rights Movement in India – The preamble to the Constitution of India, Human Rights and Duties Universal Declaration of Human Rights (UDHR), Civil, Political, Economical, Social and Cultural Rights, Rights against torture, Discrimination and forced Labour, Rights of Children.	
UNIT V GOOD GOVERNANCE AND ADDRESSING SOCIAL ISSUES	**11**
Good Governance - Democracy, People's Participation, Guaranteed Freedoms, Open and Transparence governance, Combating corruption, Fairness in criminal justice	

administration, Government system of Redressal, Judiciary, National Human Rights Commission and other statutory Commissions, Creation of Human Rights Literacy and Awareness			
	LECTURE	**SELF STUDY**	**TOTAL**
	15	**30**	**45**

REFERENCES

1. Alam, Aftab ed., Human Rights in India: 1999Issues and Challenges (New Delhi: Raj Publications,)
2. Bajwa, G.S. and D.K. Bajwa, 1996 Human Rights in India: Implementation and Violations (New Delhi: D.K. Publications,)
3. Chatrath, K. J. S., (ed.), 1998) Education for Human Rights and Democracy (Shimala: Indian Institute of Advanced Studies).
4. Jagadeesan.P., 1990. Marriage and Social legislations in Tamil Nadu, Elachiapen pub, Chennai,
5. Kaushal, Rachna, 2000 Women and Human Rights in India (New Delhi: Kaveri Books,)
6. Mani. V. S., 1998)Human Rights in India: An Overview (New Delhi: Institute for the World Congress on Human Rights,)
7. Singh Sehgal, B. P. 1999 (ed) Human Rights in India: Problems and Perspectives (New Delhi: Deep and Deep,)
8. Veeramani K. (1996), Periyar on Women Right, Emerald Publishers, Chennai, India.

COs Versus CPA (Learning Domain) mapping

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1		2						2						
CO2								3	2	1				
CO3								2	2	2				
CO4								3		2		2		
CO5								3	2	2		2		
Total		2						13	6	7		4		
Scaled Value		1						3	2	2		1		

1 – 5 → 1, 6-10 → 2, 11 – 15→ 3

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

II SEMESTER

COURSE CODE	XMA 201	L	T	P	C
COURSE NAME	CALCULUS AND LAPLACE TRANSFORMS	3	1	0	4
PREREQUISITE:	Basic concepts of Differentiation, Integration, Vectors and Complex numbers.				
C:P:A	3:0:0	L	T	P	H
		3	2	0	5

COURSE OUTCOMES		Domain	Level
CO1	***Make Use of*** standard results to ***Find*** the Laplace transforms of derivatives and integrals and to **solve** differential equations.	Cognitive	Remembering Apply
CO2	***Apply*** multiple integral concepts to ***Find*** the area, volume and to understand the order of integration	Cognitive	Remembering Apply
CO3	***Define*** the gradient, divergent curl of vectors. ***Find*** directional derivative, unit vector normal to the surface. ***Apply*** Corresponding theorems to ***Find*** the line, surface and Volume integrals.	Cognitive	Remembering Apply
CO4	***Construct*** and examine the analytic functions, and their complex Conjugate and to ***Explain*** the concept of conformal mapping and to ***Construct*** the bilinear transformation.	Cognitive	Understanding Apply
CO5	***Explain*** the poles, singularities and residues of functions and to ***solve*** the problems using contour integration.	Cognitive	Understanding Apply

UNIT I LAPLACE TRANSFORMS	**15**
Transforms of elementary functions – properties – derivatives and integrals of transforms- Transforms of derivatives and integrals - Transforms of unit step function and impulse function - Transform of periodic functions – Convolution Theorem – Inverse transforms – Solutions of differential and integral equations.	
UNIT II MULTIPLE INTEGRALS	**15**
Double integration – Cartesian and polar coordinates – change of order of integration - area as a double integral – change of variables between Cartesian and polar coordinates - triple integration-– Simple applications (Finding area & volume of a certain region).	
UNIT III VECTOR CALCULUS	**15**
Gradient, divergence and curl - directional derivative – normal and tangent to a given surface – angle between two surfaces – irrotational and solenoidal vector fields - Line, Surface and Volume Integral – Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proof).	
UNIT IV ANALYTIC FUNCTIONS	**15**

Function of a complex variable – analytic function – necessary and sufficient condition (excluding proof) – Cauchy Riemann equations – properties of analytic functions - harmonic conjugate - construction of an analytic function – Conformal mapping: w= z + c, cz, $\frac{1}{z}$, sinz, coshz, $z+\frac{k^2}{z}$ - Bilinear transformation.

UNIT V COMPLEX INTEGRATION **15**

Statement and application of Cauchy's integral theorem and integral formula - Taylor's and Laurent's expansion - Residues – Cauchy's Residue Theorem - Contour integration over unit circle.

	LECTURE	TUTORIAL	TOTAL
	45	30	75

TEXT

1. Grewal, B.S. Higher Engineering Mathematics, 41st Edition, Khanna Publication, Delhi, 2011.
2. Kreyszig, E, Advanced Engineering Mathematics, Eighth Edition, John Wiley and Son(Asia) Ltd, Singapore, 2001.

REFERENCES

1. Bali N.P and Narayana lyengar, Engineering Mathematics, Laxmi Publications (P) Ltd, New Delhi, 2003.
2. Veerarajan T, Engineering Mathematics Fourth Edition, Tata – McGraw Hill Publishing Company Ltd, New Delhi, 2005.
3. Kandasamy P., Thilagavathy K, and Gunavathy K, Engineering Mathematics Volume I, II and III, S. Chand & Co, New Delhi, 2005.
4. Venkataraman M. K, Engineering Mathematics, Volume I and II Revised enlarge Fourth Edition, The National Publishing Company, Chennai, 2004.

E REFERENCES

www.nptel.ac.in

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

Mapping of COs with GAs:

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

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

COURSE CODE	XEM 202	L	T	P	C
COURSE NAME	ENGINEERING MECHANICS	3	1	0	4
PREREQUISITE:					
C:P:A	2.6: 0.2: 0.2	L	T	P	H
		3	2	0	5

COURSE OUTCOMES		Domain	Level
CO1	***Identify*** and ***choose*** various types of loading and support conditions that act on structural and dynamic systems.	Cognitive	Understand
CO2	***Apply*** pertinent mathematical, physical and engineering mechanics principles to the system to predict the problem.	Cognitive	Application
CO3	***Apply*** knowledge on the concepts of centroid and moment of inertia of various sections and solids.	Cognitive & Affective	Application Develop
CO4	***Model*** the problem using free-body diagrams and accurate equilibrium equations and finding the solution.	Cognitive & Psychomotor	Analyze, Model
CO5	***Develop*** concepts of friction, rigid body kinematics and dynamics with an emphasis on the modeling and analysis and solving simple dynamic problems involving kinematics and momentum.	Cognitive	Create

UNIT I BASICS AND STATICS OF PARTICLES	**15**
Introduction - Units and Dimensions - Laws of Mechanics –Coplanar and Non coplanar Forces - Resolution and Composition of forces - Equilibrium of a particle - Equivalent systems of forces - Principle of transmissibility – single equivalent force.	
UNIT II EQUILIBRIUM OF RIGID BODIES	**15**
Free body diagram - Types of supports and their reactions - requirements of stable equilibrium – Equilibrium of Rigid bodies in two dimensions - Equilibrium of rigid bodies in three dimensions.	
UNIT III PROPERTIES OF SURFACES AND SOLIDS	**15**
Determination of Areas and Volumes - First moment of area and the centroid - second and product moments of plane area - Parallel axis theorem and Perpendicular axis theorem - Polar moment of inertia – Mass moment of inertia - relation to area moment of inertia.	
UNIT IV DYNAMICS OF PARTICLES	**15**
Displacement, Velocity and Acceleration - their relationships - Relative motion - Curvilinear motion - Newton's Law - Work Energy Equation of particles - Impulse and Momentum - Impact of elastic bodies.	
UNIT V ELEMENTS OF RIGID BODY DYNAMICS AND FRICTION	**15**
Translation and Rotation of Rigid Bodies - Velocity and acceleration - General Plane motion - Moment of Momentum Equations - Rotation of rigid Body - Work energy equation. Frictional Force - Laws of Coulomb friction - Simple Contact friction - Rolling Resistance - Belt Friction.	

	LECTURE	TUTORIAL	TOTAL
	45	30	75

TEXT BOOKS

1. D.S.Kumar "A text book of Engineering Mechanics" Publishers S.K.Kataria and Sons , 2012
2. R.S.Khurmi "A Textbook of Engineering Mechanics" , S. Chand Publishers, 2011
3. Engineering Mechanics: Statics (14th Edition) by Russell C. Hibbeler , Best Sellers, 2015
4. Engineering Mechanics: Dynamics (14th Edition) by Russell C. Hibbeler , Best Sellers, 2015
5. Velusami.M.A. "Engineering Mechanics with Vector Approach": S.Chand Publishers, 2012
6. J. L. Meriam, L. G. Kraige "Engineering Mechanics: Dynamics",Sixth Edition 2012

REFERENCES

1. Beer F.P and Johnson E.R., "Vector Mechanics for Engineers – Statics and Dynamics", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2001.
2. K.V.Natarajan, "Engineering Mechanics", Dhanalakshmi Publishers, Chennai, 2006.
3. Chandramouli, Engineering Mechanics, PHI Learning Pvt Ltd, 2011
   Jayakumar and Kumar , Engineering Mechanics, PHI Learning Pvt Ltd, 2013

Mapping of CO's with PO's:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO2
CO1	3	3									
CO2	3	3									
CO3	3	3									
CO4	3	3									
CO5	3	3									

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

COURSE CODE	XBW 203	L	T	P	C
COURSE NAME	ELETRICAL AND ELETRONICS ENGINEERING SYSTEMS	3	1	1	5
C:P:A	3:1:0	L	T	P	H
		3	2	2	7

COURSE OUTCOMES		Domain	Level
CO1	***Describe*** AC and DC circuits and measuring devices. ***Construct*** and ***test*** AC, DC circuits and measuring devices	Cognitive Psychomotor	Remembering, Mechanism, Set
CO2	***Explain*** different types of Electrical machines.	Cognitive Psychomotor	Remembering, Set
CO3	**Describe** semiconductor devices and show the input output characteristics of basic semiconductor devices.	Cognitive Psychomotor	Understand, Set
CO4	***Explain*** logic gates and their applications and ***construc***t ***and verify*** the logic gates and construct simple adders and sub tractors using logic gates.	Cognitive Psychomotor	Understand
CO5	***Describe*** microprocessors in detail.	Cognitive	Remembering

UNIT I FUNDAMENTAL OF DC AND AC CIRCUITS, MEASUREMENTS	10+9+20

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

UNIT II ELECTRICAL MACHINES	8 + 9

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

UNIT III SEMICONDUCTOR DEVICES	9 + 3 + 5

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

UNIT IV DIGITAL ELECTRONICS	9 + 6 + 5

Basic of Concepts of Number Systems, Logic Gates, Boolean Algebra, Adders, Subractors, multiplexer, demultiplexer, encoder, decoder, Flip-flops, Up/Down counters, Shift Registers.

UNIT V INTEL PROCESSORS	9

Architecture, 8085, 8086 - Interfacing Basics: Data transfer concepts –Simple Programming concepts.

PRACTICALS:

ELECTRICAL LABORATORY

1. Study of Electrical Symbols, Tools and Safety Precautions.
2. Calibration of Ammeter, Voltmeter, Wattmeter,Energy meter, Multimeter and Lux meter.
3. Study of Transformation ratio of Transformer.
4. Verification of AC Voltage, Current and Power in
   a) Series connection of lamps.
   b) Parallel connection of lamps.
5. Fluorescent lamp connection with choke.
6. Staircase Wiring.
7. House wiring connection.

ELECTRONICS LABORATORY

1. Study of Active and Passive elements – Resistors, Inductors and Capacitors.
2. Study of Signal Generators, Power Supplies and Voltage Regulators.
3. Study of Bread Board and Printed Circuit Board.
4. Testing of DC Voltage and Current in series and parallel resistors which are connected in breadboard by using Voltmeter, Ammeter and Multimeter.
5. Measuring input signal magnitude and frequency by using Cathode Ray Oscilloscope.
6. Forward and Reverse bias characteristics of PN junction diode.
   Forward and Reverse bias characteristics of Zener diode.
7. Verification of Truth Tables by Logic Gates.

	LECTURE	TUTORIAL	PRACTICALS	TOTAL
	45	30	30	105

TEXT BOOKS

1. Mittle, V. N., 1990. Basic Electrical Engineering. New Delhi: Tata McGraw-Hill.
2. Malvino, A. P., 2006. Electronics Principles. 7th ed. New Delhi: Tata McGraw-Hill.
3. Rajakamal, 2007. Digital System-Principle & Design. 2nd ed. Pearson Education.
4. Moris Mano, 1999. Digital Design. Prentice Hall of India.
5. Ramesh, S. Gaonkar, 2000. Microprocessor Architecture, Programming and its Applications with the 8085. 4th ed. India: Penram International Publications.

REFERENCES

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

COs versus GAs mapping

CO/GA	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA 10	GA 11	GA 12
CO1	3	2	2	2	1	-	-	-	1	-	-	1
CO2	3	2	-	2	1	-	-	-	-	-	-	1
CO3	3	-	-	-	1	-	-	-	1	-	-	1
CO4	3	2	2	2	1	-	-	-	1	-	-	1
CO5	3	-	-	-	1	-	-	-	-	-	-	1
Total	15	6	4	6	5				3			5
Scaling	3	1	1	1	1				1			1

COURSE.CODE	COURSE NAME	L	T	P	C
XAP 204	APPLIED PHYSICS	3	1	1	5
PREREQUISITE:					
C:P:A	2.875:0.875:0.25	L	T	P	H
		3	2	2	7

COURSE OUTCOMES		Domain	Level
CO1	***Identify*** the basics of mechanics, ***explain*** the principles of elasticity, viscosity and ***determine*** its significance in engineering systems and technological advances.	Cognitive &Psycho motor	Remember, Understand, Mechanism
CO2	***Describe*** the production, propagation, perception &***analysis*** of acoustical wave and ***locate*** basic acoustical problem encountered in constructed buildings.	Cognitive & Affective	Remember, Analysis, Receiving
CO3	***Understand*** the fundamental phenomena in optics by ***measurement*** and ***describe*** the working principle and ***application*** of various lasers and fibre optics.	Cognitive ,Psychom otor & Affective	Understand, Mechanism, Receiving
CO4	***Analyse*** different crystal structures, ***discuss*** and ***use*** physics principles of latest technology by ***visualizing.***	Cognitive ,Psychom otor & Affective	Analysis, Understand, Mechanism, Receiving
CO5	***Develop Knowledge*** on engineering materials, its properties and ***application.***	Cognitive	Understand, Apply

THEORY

UNIT - I MECHANICS AND PROPERTIES OF MATTER **9+6+12**

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 - I shape girders.

Viscosity: Coefficient of viscosity-Laminar flow - streamline flow - turbulent flow - Reynold's number - Poiseuille's method.

UNIT – II ACOUSTICS, ULTRASONICS AND SHOCK WAVES **9+6**

Acoustics: Classification of sound - Characteristics of musical sound - Loudness - Weber Fechner law - Decibel - Absorption coefficient - Reverberation - Reverberation time - Sabin's formula (growth and decay) - Factors affecting acoustics of buildings (reverberation time, loudness, focussing, echo, echelon effect - resonance and noise) and their remedies.

Ultrasonics: Production: Magnetostriction and Piezoelectric methods - NDT: Ultrasonic flaw detector.

Shock waves: Definition of Mach number - Description of a shock wave - Characteristics - Methods of creating shock waves.

UNIT – III OPTICS, LASERS AND FIBRE OPTICS	9+6+12

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

LASER: Introduction - Population inversion -Pumping - Laser action - Nd-YAG laser - CO_2 laser - Semiconductor Laser (homojunction) - Applications

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

UNIT –IV SOLID STATE PHYSICS	9+6+6

Crystal Physics: Lattice - Unit cell - Lattice planes - Bravais lattice - Miller indices - Sketching a plane in a cubic lattice - Calculation of number of atoms per unit cell - Atomic radius - Coordination number - Packing density for SC, BCC, FCC and HCP structures.

Semiconductors: Semiconductor properties - Types of semiconductor - Intrinsic - Extrinsic: P-type and N-type semiconductor - PN junction diode - Biasing - Junction diode characteristics.

UNIT –V NOVEL ENGINEERING MATERIALS AND BIOMETRICS	9+6

Novel Engineering Materials: Introduction - Metallic glasses: Melt spinning technique, properties, applications - Shape Memory Alloys: Transformation temperature, working of SMA, characteristics - Biomaterials: Properties, interaction of biomaterials with tissues, applications - Nano phase materials: Production, properties and applications.

Biometrics: Introduction - definition - instrumentation - devices –advantages.

TEXT BOOKS

1. Avadhanulu M. N. and Kshirsagar P. G., "A Text Book of Engineering Physics", 7th Enlarged Revised Edition., S. Chand & Company Ltd., New Delhi, 2005.
2. Senthil Kumar G., " Engineering Physics", 2nd Enlarged Revised Edition, VRB Publishers, Chennai, 2003.
3. Mani P., "Engineering Physics", Dhanam Publications, Chennai, 2005.
4. Prabu P. and Gayathri P., " Applied Physics", PMU Press, Thanjavur, 2013

REFERENCES

1. Gaur R.K. and Gupta S. L., "Engineering Physics", DhanpatRai Publishers, New Delhi, 2001.
2. Pillai S.O., "Solid State Physics", 5th Edition, New Age International Publication, New Delhi,2003.

E RESOURCES

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

LABORATORY

1. Torsional Pendulum - determination of moment of inertia and rigidity modulus of the given material of the wire.
2. Uniform Bending - Determination of the Young's Modulus of the material of the beam.
3. Non-Uniform Bending - Determination of the Young's Modulus of the material of the beam.

4. Poiseuille's flow - Determination of coefficient of viscosity of the given liquid.
5. Spectrometer - Determination of dispersive power of the give prism.
6. Spectrometer - Determination of wavelength of various colours in Hg source using rating.
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. Srinivasan M. & others, "A text book of Practical Physics", Sultan Chand & Sons, 2001.
2. Shukla R.K., "Practical Physics", New Age International Publication, New Delhi, 2011.
3. UmayalSundari AR., "Applied Physics Laboratory Manual", PMU Press, Thanjavur, 2012.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	**30**	**30**	**105**

Mapping of CO's with GA's:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	3	2	2	2	1	-	-	-	1	-	-	1
CO2	3		1		1	-	-	-		-	-	1
CO3	3	2	2	2	1	-	-	-	1	-	-	1
CO4	3	2	2	2	1	-	-	-	1	-	-	1
CO5	3		2			-	-	-		-	-	1
Total	**15**	**6**	**9**	**6**	**4**				**3**			**5**
Scaled to 0,1,2,3 scale	**3**	**2**	**2**	**2**	**1**				**1**			**1**

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

COURSE CODE	XEG 205	L	T	P	C
COURSE NAME	ENGINEERING GRAPHICS	2	0	1	3
PREREQUISITE:					
C:P:A	1:1:1	L	T	P	H
		2	0	2	4

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

UNIT I INTRODUCTION, FREE HAND SKETCHING OF ENGG OBJECTS AND CONSTRUCTION OF PLANE CURVE **12**

Importance of graphics in engineering applications – use of drafting instruments – BIS specifications and conventions as per SP 46-2003.

Pictorial representation of engineering objects – representation of three dimensional objects in two dimensional media – need for multiple views – developing visualization skills through free hand sketching of three dimensional objects.

Polygons & curves used in engineering practice – methods of construction – construction of ellipse, parabola and hyperbola by eccentricity method – cycloidal and involute curves – construction – drawing of tangents to the above curves.

UNIT II PROJECTION OF POINTS, LINES AND PLANE SURFACES **12**

General principles of orthographic projection – first angle projection – layout of views – projections of points, straight lines located in the first quadrant – determination of true lengths of lines and their inclinations to the planes of projection – traces – projection of polygonal surfaces and circular lamina inclined to both the planes of projection.

UNIT III PROJECTION OF SOLIDS AND SECTIONS OF SOLIDS **12**

Projection of simple solids like prism, pyramid, cylinder and cone when the axis is inclined to one plane of projection – change of position & auxiliary projection methods – sectioning of above solids in simple vertical positions by cutting plane inclined to one reference plane and perpendicular to the other and above solids in inclined position with cutting planes parallel to one reference plane – true shapes of sections.

UNIT IV	DEVELOPMENT OF SURFACES AND INTERSECTION OF SOLIDS	12

Need for development of surfaces – development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cones – development of lateral surfaces of the above solids with square and circular cutouts perpendicular to their axes – intersection of solids and curves of intersection –prism with cylinder, cylinder & cylinder, cone & cylinder with normal intersection of axes and with no offset.

UNIT V	ISOMETRIC AND PERSPECTIVE PROJECTIONS	12

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones – principles of perspective projections – projection of prisms, pyramids and cylinders by visual ray and vanishing point methods.

	LECTURE	PRACTICALS	TOTAL
	30	30	60

TEXT BOOKS

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

REFERENCES

1. Luzadder and Duff, "Fundamentals of Engineering Drawing" Prentice Hall of India Pvt Ltd, XI Edition – 2001
2. Venugopal,K. and Prabhu Raja, V., "Engineering Graphics", New Age International(P) Ltd., 2008.
3. Gopalakrishnan.K.R,. "Engineering Drawing I & II", Subhas Publications, 1998.

Shah,M.B and Rana,B.C.,"Engineering Drawing", Pearson Education,2005.

E-RESOURCES:

http://periyarnet/Econtent

Mapping of CO's with GA:

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	3	2	3	1	1							1
CO2	3	2	1	1	1							1
CO3	3	2	1	1	1							1
CO4	3	2	1	1	1							1
CO5	3	2	1	1	1							1
Total	15	10	7	5	5							5
Scaled	3	2	2	1	1							1

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

COURSE CODE	XGS 206	L	T	P	C
COURSE NAME	SPEECH COMMUNICATION	1	0	0	3
C:P:A		L	T	P	H
		1	0	0	4

COURSE OUTCOMES		Domain	Level
CO1	I***dentify*** different styles to various forms of public speaking skills and presentation skills.	Cognitive	Remembering
CO2	***Understand*** and identify the proper tone of language required in writing and speaking.	Cognitive	Understanding
CO3	***Adapting*** the speech structures and developing the speech outline.	Psychomotor	Analysis
CO4	Ability to ***communicate*** and develop presentation skills.	Affective	Remembering
CO5	**Calibrates** the speaker to face the audience without any anxiety.	Psychomotor	Remembering

UNIT I INTRODUCTION TO PUBLIC SPEAKING	**9**
Functions of oral communication; skills and competencies needed for successful speech making; importance of public speaking skills in everyday life and in the area of business, social, political and all other places of group work	
UNIT II TYPES OF SPEECH	**9**
Manuscript, impromptu, rememorized and extemporaneous speeches; analyzing the audience and occasion; developing ideas; finding and using supporting materials.	
UNIT III ORGANIZATION OF SPEECH	**9**
Introduction, development and conclusion; language used in various types of speeches; Adapting the speech structures to the Audience; paralinguistic features	
UNIT IV BASIC TIPS	**9**
how to present a paper/assignment etc; using visual aids to the speeches; using body language to communicate.	
UNIT V SPEECH ANXIETY	**9**
Public speaking and speech anxiety, public speaking and critical listening Speech practice (4-6 speeches per student)	

	LECTURE	**SELF STUDY**	**TOTAL**
	15	**30**	**45**

TEXT BOOKS

1. Gordon H. Mills Technical Writing –Oxford Press, 1978
2. Barun K. Mitra, Effective Technical Communication: A guide for scientists and Engineers. Author, Publication: Oxford University press. 2007

Mapping of COs with GAs:

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

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

III SEMESTER

COURSE CODE	XDM 301	L	T	P	C
COURSE NAME	DISCRETE MATHEMATICS	3	1	0	4
PREREQUISITES	XMA 101, XMA 201	L	T	P	H
C:P:A	3:0:0	3	2	0	5

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Define*** and ***Explain*** fundamental Mathematical concepts such as sets, relations, functions and integers.	Cognitive	Remember, Understand
CO2	***Apply*** permutations and combinations to ***solve*** counting problems with and without repetition and to ***solve*** linear recurrence equations.	Cognitive	Apply
CO3	***Identify*** and ***Explain*** different types of graphs and their properties.	Cognitive	Understand Apply
CO4	***State*** and ***Explain*** various algebraic structures and corresponding thereoms.	Cognitive	Remember, Understand
CO5	Understand the basic concepts of lattices and to ***Apply*** them to derive Boolean expressions.	Cognitive	Apply

UNIT I - LOGIC AND PROOFS **9+6**

Propositional Logic – Propositional equivalences-Predicates and quantifiers-Nested Quantifiers-Rules of inference- Methods of Proofs.

UNIT II - COMBINATORICS **9+6**

Mathematical induction-Strong induction and well ordering-.The basics of counting-The pigeonhole principle –Permutations and combinations-Recurrence relations-Solving Linear recurrence relations-generating functions-inclusion and exclusion and applications.

UNIT III - GRAPHS **9+6**

Graphs and graph models-Graph terminology and special types of graphs-Representing graphs and graph isomorphism - connectivity-Euler Graphs and Hamilton cycle.

UNIT IV – ALGEBRAIC STRUCTURES **9+6**

Algebraic systems-Semigroups and monoids-Groups-Subgroups and homomorphisms-Cosets and Lagrange's theorem- Rings & Fields (Definitions and examples).

UNIT V - LATTICES AND BOOLEAN ALGEBRA **9+6**

Partial ordering-Posets-Lattices as Posets- Properties of lattices-Lattices as Algebraic systems –Sub lattices –direct product and Homomorphism-Some Special lattices- Boolean Algebra.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
HOURS	45	30	0	75

TEXT BOOKS

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 6th Edition, Special Indian edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2007.
2. Trembly J.P and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th Re-print 2007.

REFERENCES

1. Ralph.P.Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia, New Delhi, (2002).
2. Alan Doerr and Kenneth Levasseur , **"**Applied Discrete Structures for Computer Science**"** Second Edition St. Martin's Press, New York, (1991).

E REFERENCES

www.nptel.ac.in

1. Graph Theory A NPTEL Course, S.A. Choudum , IIT Madras.
2. Graph Theory by Prof. L. Sunil Chandran, Department of Computer Science and Automation, Indian Institute of Science, Bangalore.

Mapping of COs with GAs:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	2								2		1		
CO2	3	2								2		1		
CO3	3	2								2		1		
CO4	3	2								2		1		
CO5	3	2								2		1		
Total	**15**	**10**								**10**		**5**		
Scaled Value	**3**	**2**								**2**		**1**		

COURSE CODE	COURSE NAME	L	T	P	C
XCS302	DATA COMMUNICATION	3	1	0	4
C:P:A = 3:1:0					
		3	2	0	5

COURSE OUTCOMES		DOMAIN	LEVEL
CO 1	***Understand*** the basic concepts for data communication	Cognitive	Knowledge,
CO 2	***Understand*** the error detection and error correction in the data link layer.	Cognitive	Analysis
CO 3	***Understand and analyze*** networks layer functions and subnet creation	Cognitive	Knowledge ,Analysis
CO 4	***Understand*** the concepts of transport layer	Cognitive	Knowledge
CO 5	***Recognize*** the design issue of application layer	Cognitive	Analysis

UNIT I DATA COMMUNICATIONS **9+3**

Data Transmission – Transmission Media – Signal Encoding Techniques – Multiplexing – Spread Spectrum. Interfaces and modems - Digital data transmission - Parallel and Serial DTE / DCE interface data terminal equipment, data circuit terminating equipment - Standards RS 232, Transmission rate of modems, Modem standards.

UNIT II DATA LINK LAYER **9+3**

Types of errors and detection, redundancy, VRC, LRC, CRC techniques - Error correction - Forward and backward error correction - Single bit and multi bit error correction - Hamming code. Data link control: Need for data link control - Line discipline, ENQ / ACK, Flow control stop and wait sliding window protocol, Error control, ARQ, Stop and wait ARQ, Sliding window ARQ Protocols: Asynchronous and Synchronous communications - Asynchronous and Synchronous Protocol - Character oriented protocol, BSC, bit oriented protocols - HDLC frames - Link access procedures.

UNIT III NETWORK LAYER **9+3**

Network layer design issues, Congestion Control algorithm, Internetworks – Packet switching and Datagram approach – IP addressing methods – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.

UNIT IV TRANSPORT LAYER **9+3**

Duties of Transport Layer – Multiplexing – De multiplexing – Sockets – User Datagram Protocol(UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of Service (QOS) – Integrated Services., Connection management .

UNIT V APPLICATION LAYER **9+3**

Domain Name Space (DNS) – SMTP – POP 3 – FTP – HTTP – WWW- Security - Cryptography Case study on TCP/IP Architecture , Directory services - Common Management Information Protocol - TCP/IP: TCP/IP and the Internet - TCP/IP and OSI.

LECTURE	TUTORIAL	Total
45	15	60

TEXT BOOKS:

1. Behrouz A Forouzan "Data Communications Networking**"** 4th Edition Tata McGraw Hill, 2008.
2. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks", 5th Edition, 2010, ISBN-10: 0132126958, ISBN-13: 978-0132126953
3.

REFERENCES

1. William Schewber ,"Data Communication", McGraw Hill, 2009.
2. Tanenbaum , "Computer Networks", PHI, 5th Edition, 2011

EREFERENCES

1. http://people.du.ac.in/~ngupta/teach_networks.html
2. http://www.cs.hunter.cuny.edu/~saad/courses/networks/notes/note1_ho.pdf
3. http://www.vub.ac.be/BIBLIO/nieuwenhuysen/courses/chapters/network.pdf
4. http://lecturenotes.in/notes/engg/paper/dccn/page1.html

COURSE CODE	COURSE NAME	L	T	P	C
XCS303	DIGITALSYSTEMS AND MICROPROCESSORS	3	0	1	4
C:P:A = 1.8: 1.8: 0.4		L	T	P	H
		3	0	2	5

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the basics and functions of logic gates	Cognitive Psychomotor	Understanding Applying
CO2	***Design*** and **implement** different types of combinational logic circuits using logic gates	Cognitive Psychomotor	Applying Manipulation
CO3	***Design*** *and* ***implement*** different types of sequential logic circuits using flip flops.	Cognitive Psychomotor	Applying Manipulation
CO4	***Discuss*** the fundamentals of microprocessors and ***execute*** the program on 8085.	Cognitive Psychomotor Affective	Understanding Applying Responding
CO5	***Illustrate*** programming concepts of 8085 and ***develop*** applications by interfacing I/O devices.	Cognitive Psychomotor Affective	Applying, Manipulation Responding

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES **8+3**

Review of binary number systems - Binary arithmetic – Binary codes – Boolean algebra and theorems - Boolean functions – Simplifications of Boolean functions using Karnaugh map and tabulation methods – Logic gates.

List of Experiments:

1.Verification of Boolean theorems using digital logic gates

UNIT II COMBINATIONAL LOGIC AND DESIGN WITH MSI DEVICES **9+12**

Combinational circuits – Analysis and design procedures - Circuits for arithmetic operations - Code conversion – Decoders and encoders - Multiplexers and de-multiplexers.

List of Experiments:

2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters, etc.
3. Design and implementation of 4-bit binary adder / subtractor using basic gates and MSI devices
4. Design and implementation of magnitude comparator
5. Design and implementation of application using multiplexers/Demultiplexers

UNIT III SYNCHRONOUS SEQUENTIAL LOGIC **10+6**

Sequential circuits – Flip flops – Shift registers – Counters - Memory and programmable logic.

List of Experiments:

6. Design and implementation of Shift registers
7. Design and implementation of Synchronous and Asynchronous counters

UNIT IV 8085 MICROPROCESSOR **9+3**

8085 Microprocessor architecture-Addressing modes- Instruction set-Programming with 8085.

List of Experiments:

8. Programming with 8085

UNIT V I/O INTERFACING	**9+6**
Memory interfacing and I/O interfacing with 8085 – parallel communication interface – serial communication interface – timer-keyboard/display controller – interrupt controller – DMA controller (8237) – applications – stepper motor – Wave form Generator. **List of Experiments:** 9. Interfacing with 8085-8255, 8253 10. Interfacing with 8085-8279, 8251	

LECTURE	**PRACTICAL**	**TOTAL**
45	**30**	**75**

TEXT BOOKS:

1. M.Morris Mano, "Digital Design", 3rd edition, Pearson Education, 2007.
2. Ramesh S. Gaonkar ,"Microprocessor – Architecture, Programming and Applications with 8085" , Penram International Publisher , 5th Ed.,2006.

REFERENCES:

1. Charles H.Roth, Jr., "Fundamentals of Logic Design", 4th Edition, Jaico Publishing House, Latest Edition.
2. Donald D.Givone, "Digital Principles and Design", Tata McGraw-Hill, 2007.
3. Douglas V.Hall, " Microprocessors and Interfacing : Programming and Hardware", Second Edition , Tata McGraw Hill , 2006.

E-REFERENCES:

1. http://nptel.ac.in/courses/117106086/
2. http://nptel.ac.in/syllabus/108107029/

Mapping of COs with POs:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	0	0	0	0	0	0	0	0	0	0	0	3	2
CO2	3	3	3	1	0	0	0	0	0	0	0	0	3	2
CO3	3	3	3	3	3	1	0	0	0	0	0	0	3	2
CO4	3	3	3	3	3	1	0	0	0	0	0	0	3	2
CO5	3	3	3	1	1	1	0	0	0	1	0	0	3	2
Total	15	12	12	8	7	3	0	0	0	1	0	0	15	10

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O 1**	**PS O 2**
Original value	15	12	12	8	7	3	0	0	0	1	0	0	15	10
Scaled to 0,1,2,3 scale	3	3	3	2	2	1	0	0	0	1	0	0	3	2

COURSE CODE	COURSE NAME	L	T	P	C
XCS304	**DATA STRUCTURES**	**3**	**1**	**1**	**5**
C:P:A=3:1:0					
		L	T	P	H
		3	**2**	**2**	**7**

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	To know, ***analyze, apply*** and manipulate linear data structures	Cognitive	Knowledge, Comprehension
CO2	To know, ***analyze, apply*** and manipulate nonlinear data structures	Cognitive	Knowledge, Analysis
CO3	To know, ***analyze, apply*** and manipulate sorting techniques	Cognitive	Knowledge, Analysis and Application
CO4	To know, ***analyze, apply*** and manipulate graph algorithms	Cognitive	Knowledge, Analysis
CO5	To know and ***analyze*** algorithm design techniques.	Cognitive	Knowledge, Analysis

UNIT -1 LINEAR DATA STRUCTURE **12 + 12**

Theory

ADT – List ADT – Stack ADT – Queue ADT.

Practical

1. Singly Linked List
2. Doubly linked List
3. Circular Linked List
4. Linked List Implementation of Stack
5. Stack Using Array implementation
6. Linked List Implementation of Queue
7. Queue Using Array Implementation
8. Program for Balancing symbol
9. Program for Postfix expression evaluation

UNIT- II NON LINEAR DATA STRUCTURE **12 + 6**

Theory

Trees – Binary Trees – Binary Search Trees – AVL Trees – Splay Trees – Tree Traversal – B Trees

Practical

1. Implementing Expression Tree
2. Binary Search Tree
3. AVL Tree

UNIT- III SORTING **12+ 6**

Theory

Insertion sort – Shell sort – Heap sort – Merge sort – Quick sort – Bucket sort – External Sorting

Practical

1. Insertion Sort
2. Shell Sort
3. Heap Sort
4. Merge Sort
5. Quick Sort
6. Bucket Sort

UNIT – IV GRAPH ALGORITHMS	12+ 6

Theory

Topological sort – Shortest path algorithms – Network Flow problems – Minimum Spanning Tree – Applications of Depth First search – NP completeness.

Practical

1. Dijkstra's Algorithm
2. Prim's Algorithm
3. Kruskal's Algorithm.

UNIT – V ALGORITHM DESIGN TECHNIQUES	12

Theory

Greedy Algorithms – Divide and Conquer – Dynamic Programming - Randomized Algorithms – Backtracking algorithms

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	15	30	90

TEXT BOOKS

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, Reprint 2011.

REFERENCES

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002.
2. Reema Thareja, "Data Structures Using C", Oxford University Press, 2011.

E – REFERENCES

1. http://spoken-tutorial.org/tutorial-search/?search_foss=C+and+Cpp&search_language=English
2. Lecture Series on Data Structures and Algorithms by Dr. Naveen Garg, Department of Computer Science & Engineering ,IIT Delhi.
3. http://www.learncpp.com/
4. http://vlab.co.in

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	3	1	1	1	1	0	0	0	1	0	1	1	3	3
CO2	3	2	1	1	1	0	0	0	1	0	1	1	3	3
CO3	3	1	1	1	1	0	0	0	1	0	1	1	3	3
CO4	3	2	1	2	1	0	0	0	1	0	1	1	3	3
CO5	3	1	1	2	0	0	0	0	0	0	1	2	0	0
Total	15	7	5	7	4	0	0	0	4	0	5	6	12	12

Courses	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Original	15	7	5	7	4	0	**0**	**0**	4	0	5	6	12	12
Scaled to 0,1,2,3 scale	3	2	1	2	1	0	0	0	1	0	1	2	3	3

COURSE CODE	COURSE NAME	L	T	P	C
XMS305	MATERIAL SCIENCE	3	0	0	3
C:P:A = 3:0:0		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Recall and distinguish*** various crystal structures.	Cognitive	Remember, Analyze
CO2	***Know*** about the impacts of defects at the atomic and microstructure scales.	Cognitive	Remember, Understand
CO3	***Describe*** the various Ceramic, Electrical & Electronic Materials.	Cognitive	Remember, Analyze
CO4	***Describe*** the basics of mechanical properties of material and identify how they can be tested.	Cognitive	Remember, Analyze
CO5	***Recognize and Describe*** various Magnetic Materials and Nano Materials.	Cognitive	Remember

UNIT I	CRYSTAL STRUCTURE	9

Atomic structure and inter-atomic bonding; Structure of crystalline solids; Lattices, unit cells; Crystal systems, Bravais lattices; Indexing of directions and planes, notations, Inter-planar spacings and angles, co- ordination number, packing factors.

UNIT II	DEFECTS IN CRYSTALS	9

Point defects; Dislocations, Types of dislocations, Burgers vector and its representation; Planar defects, stacking faults, twins, grain boundaries.

UNIT III	CERAMIC, ELECTRICAL & ELECTRONIC MATRIALS	9

Ceramic Materials: Introduction, ceramic structures, silicate structures, processing of ceramics; Properties, glasses; Composite Materials- Introduction, classification, concrete, metal-matrix and ceramic –matrix composites. **Electrical & Electronic Properties of Materials:** Electrical Conductivity, Electronic and Ionic Conductivity, Intrinsic and Extrinsic Semi conductivity, Semiconductor Devices, Dielectric Properties, Piezo-electricity.

UNIT IV	MECHANICAL PROPERTIES OF MATERIALS	9

Concepts of stress and strain, Stress-Strain diagrams; Properties obtained from the Tensile test; Elastic deformation, Plastic deformation. Impact Properties, Strain rate effects and Impact behavior. Hardness of materials.

UNIT V	MAGNETIC MATERIALS AND NANO MATERIALS	9

Magnetic Materials: Introduction, Magnetic fields or quantities, types of magnetism, classification of magnetic materials, soft magnetic materials, H magnetic materials, Ferrites, Ferro, Para Magnetic materials.

Nano Materials: Introduction – Nano material preparation, purification, sintering nano particles of Alumina and Zirconia, Silicon carbide, nanoop, nano-magnetic, nano-electronic, and other important nano materials.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	-	-	45

TEXT BOOKS

1. Askeland D.R.,& P. P. Fullay (2007), The Science and Engineering of Materials – 7th Cengage Learning Publishers.
2. William D. Callister, Jr (2008), Callister‟s Materials Science and Engineering, (Adopted by R. Balasubramaniam) Wiley-Eastern

REFERENCES

1. A.S. Edelstein and R.C. Cammarata Ed. (1998), Nano Materials: Synthesis, Properties and Applications, Inst. Of Physics Publishing, UK.
2. Raghavan, V (2007), Materials Science and Engineering - A First Course, Prentice Hall, India
3. James F. Shackelford (1996), Introduction to Materials Science for Engineers, Prentice Hall, India

Mapping of COs with GAs:

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

Total	15	6	0	3	0	0	3	0	0	3	0	0
Scaled	3	2	0	1	0	0	1	0	0	1	0	0

COURSE CODE	XEP 306	L	T	P	C
COURSE NAME	ENTREPRENEURSHIP DEVELOPMENT	2	0	0	2

PREREQUISITE:	Nil	L	T	P	SS	H
C:P:A	2.7 : 0 : 0.3	2	0	0	1	3

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

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

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	0	0	45

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.

REFERENCES

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. Available from: http://www.ediindia.org/doc/EDP-TEDP.pdf

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/

Mapping of COs with GAs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1	0	0	0	1	2	0	1	1	1	1	2	1	0	0
CO 2	0	0	0	0	0	2	0	1	0	1	1	1	0	0
CO 3	0	0	2	0	0	3	2	1	3	3	3	3	0	1
CO 4	1	0	1	3	0	0	0	0	0	1	2	0	0	0
CO 5	1	1	1	3	0	0	0	0	0	2	2	1	0	0
Total	2	1	4	7	2	5	3	3	4	8	10	6	0	0
Scaled to 0,1,2,3	1	1	1	2	1	1	1	1	1	2	2	2	0	1

COURSE CODE		L	T	P	SS	C
COURSE NAME	INTERPERSONAL COMMUNICATION	0	0	0	2	0
XGS307		L	T	P	SS	H
C:P:A	2:0:0	0	0	0	2	2

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Recognize*** culture and a need for interpersonal communication.	Cognitive	Remember
CO2	***Demonstrate*** the need for effective communication between two people.	Cognitive	Understand
CO3	***Explain*** family and social relationships and need for socialization.	Cognitive	Understand
CO4	***Justifies*** the IP principles as to how to reduce and repair conflict in interpersonal relationships.	Cognitive	Evaluate
CO5	***Make use*** of effective and appropriate language at various interpersonal situations to avoid conflict.	Cognitive	Apply

UNIT I - UNIVERSALS OF INTERPERSONAL COMMUNICATIONS	**5**
Axioms of interpersonal Communication - culture in interpersonal communication and the self in interpersonal communication.	
UNIT II - APPREHENSION AND ASSERTIVENESS	**5**
Aggressiveness and assertiveness - perception in interpersonal communication - listening in interpersonal communication**.**	
UNIT III - VERBAL AND NON VERBAL MESSAGES	**5**
Relationship and involvement - relationship maintenance and repair.	
UNIT IV - POWER IN INTERPERSONAL RELATIONSHIP	**5**
Conflict in interpersonal relationship - friends and relatives - primary and family relationships.	
UNIT V – SOCIALIZATION	**10**
Need for socialization and benefits of socialization among students.	

	Self-Study	TOTAL
	30	**30**

TEXT BOOKS

1.DeVito, Joseph, The *Interpersonal Communication* Book, 13th Edition -, Published by *Longman* Pub Group, Updated in its *13th edition*,2000

2.Kathleen S. Verderber, Inter-Act: Interpersonal Communication Concepts, Skills and Contexts, Rudolph F. Verderber, 2000

REFERENCES

1.Clifford Whitcomb, Effective Interpersonal and Task Communication Skills for Engineers, Atlantic Publishers. 2010

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

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

XCS308 INPLANT TRAINING – I

C:P:A = 0.34:0.33:0.33

Mapping of COs with GAs:

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

Total	2	1	2	4	3	0	1	3	3	4	4	5
Scaled	1	1	2	1	1	0	1	1	1	1	1	1

IV SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
XPQ 401	PROBABILITY AND QUEUEING THEORY	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Define*** discrete and continuous random variables and to ***Find*** the expected values and moment generating functions of discrete and continuous distributions.	Cognitive	Remember
CO2	***Explain*** the joint and Marginal distribution and to ***Find*** the Correlation and regression.	Cognitive	Remember, Understand
CO3	***State*** and find WSS, SSS, autocorrelation, cross-correlation, ergodic process and their properties and to ***identify*** and ***Explain*** Markov and Poisson processes.	Cognitive	Remember, Understand, Analysis
CO4	***Explain*** the Markovian models and to ***Find*** the characteristics of the models	Cognitive	Remember, Understand,
CO5	***Explain*** the basic concepts of queuing theory and the Non – Markovian	Cognitive	Remember, Understand,

UNIT I RANDOM VARIABLES	**9**
Discrete and continuous random variables - Moments, Moment Generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.	
UNIT II TWO DIMENSIONAL RANDOM VARIABLES	**9**
Joint distributions – Marginal and conditional distributions – covariance – Correlation and linear regression.	
UNIT III RANDOM PROCESSES	**9**
Classification – Stationary process –Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations –Limiting distributions.	
UNIT IV QUEUEING THEORY	**9**
Markovian queues – Birth and Death processes – Single and multiple server queueing models – Little's formula - Queues with finite waiting rooms – Finite source models.	
UNIT V NON-MARKOVIAN QUEUES AND QUEUEING NETWORKS	**9**
M/G/1 queue – Pollaczek Khintchine formula - M/D/1 and M/Ek/1 as special cases – Series queues.	

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS

1. Gupta .S.C and Kapoor .V.K, "Fundamentals of Mathematical Statistics", 11th extensively revised edition, Sultan Chand & Sons, 2007.
2. Veerarajan .T, Probability, "Statistics and Random Processes", Tata McGraw Hill,3rd edition, 2008.
3. Kandasamy.P, Thilagavathy.K, Gunavathy.K, "Probability,Statistics and Queueing Theory", S.Chand & Company Ltd, 2004.

REFERENCES

1. Allen, A.O., "Probability, Statistics and Queueing Theory with Computer Applications", Elsevier, 2nd edition, (2005).
2. Taha, H.A., "Operations Research", Pearson Education", Asia, 8th edition, (2007).
3. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2nd edition, (2002).
4. 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

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

Mapping of COs with POs:

	GA1	GA2	GA3	GA4	GA5	GA6	GA 7	GA 8	GA 9	GA 10	GA 11	GA 12
CO 1	3	0	0	0	0	0	0	0	1	1	0	1
CO 2	3	0	0	0	0	0	0	0	1	1	0	1
CO 3	3	2	0	0	0	0	0	0	0	1	1	2
CO 4	3	2	0	0	1	0	0	0	1	1	1	2
CO 5	3	2	0	0	1	0	0	0	1	1	1	2
Total	15	6	0	0	2	0	0	0	4	5	3	8

Total	15	6	0	0	2	0	0	0	4	5	3	8
Scaled	3	2	0	0	1	0	0	0	1	1	1	2

COURSE CODE	COURSE NAME	L	T	P	C
XCS402	COMPUTER ARCHITECTURE	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** fun ction al unit of computer and ***Recognize*** Various Addressing modes.	Cognitive	Remember, Understand
CO2	***Describe and Analyze*** of arithmetic unit.	Cognitive	Remember, Analysis
CO3	***Describe*** and ***Recognize*** the basic processing unit.	Cognitive	Remember, Understand
CO4	***Explain*** and ***Illustrate*** the memory System.	Cognitive	Remember, Analysis
CO5	***Explain and Analyze*** the I/O Organization.	Cognitive	Remember , Analysis

UNIT I BASIC STRUCTURE OF COMPUTERS **10**

Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues- Measuring, Reporting and Summarizing Performance – Quantitative principles of computer design

UNIT II ARITHMETIC UNIT **8**

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).

	LECTURE	TUTORIAL	TOTAL
	45	-	45

TEXT BOOKS

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 6th Edition “Computer Organization”, McGraw-Hill, 2012.
2. John L. Hennessey and David A. Patterson," Computer Architecture: A Quantitative Approach", 5th Edition, Morgan Kaufmann, 2011

REFERENCES

1. William Stallings, “Comp
2. uter Organization and Architecture – Designing for Performance”, 9th Edition, Pearson Education, 2010.
3. John P.Hayes, “Computer Architecture and Organization”, 3rd Edition, McGraw Hill,1998

E REFERENCES

1.http://cse10-iitkgp.virtual-labs.ac.in.

2.Lecture Series on Computer Architecture by Prof. Anshul Kumar, Department of Computer Science & Engineering ,IIT Delhi.

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O 2
CO 1	3	2	3	2	2	1	1	0	0	0	2	2	3	1
CO 2	3	2	3	1	2	1	2	0	0	0	1	1	3	1
CO 3	3	2	2	2	2	1	1	0	0	0	3	1	3	1
CO 4	3	2	2	1	2	1	1	0	0	0	1	1	3	1
CO 5	3	2	3	2	1	1	1	0	0	0	2	1	3	1
Total	**15**	**10**	**13**	**8**	**9**	**5**	**6**	**0**	**0**	**0**	**9**	**6**	**15**	**5**
Scaled Value	**3**	**2**	**3**	**2**	**2**	**1**	**2**				**2**	**2**	**3**	**1**

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Original value	15	10	13	8	9	5	6	0	0	0	9	6	15	5
Scaled to 0,1,2,3 scale	3	3	3	2	2	1	2	0	0	0	2	2	3	1

COURSE CODE	COURSE NAME	L	T	P	C
XCS403	OBJECT ORIENTED PROGRAMMING WITH JAVA	3	0	1	4
C: P: A = 2:0.5:0.5					
		L	T	P	H
		3	0	2	5

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

COURSE CONTENTS

UNIT – I PROGRAMMING IN C++ **9+3**

Object-oriented paradigm, elements of object oriented programming – Merits and demerits of OO methodology – C++ fundamentals, Classes and objects, Constructors and destructors, operator overloading – inheritance, functions and polymorphism.

List of Experiments:

1. Design C++ classes with static members, methods with default arguments, friend functions.
2. Implement complex number class with necessary operator overloading and type conversions such as integer to complex, double to complex, complex to double etc.

UNIT – II FILE HANDLING IN C++ **9+3**

C++ streams – console streams – console stream classes-formatted and unformatted console I/O operations, manipulators - File streams - classes file modes file pointers and manipulations file I/O – Exception handling.

List of Experiments:

1. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor, and overloading of assignment operator.
2. Overload the new and delete operators to provide custom dynamic allocation of memory.

UNIT – III JAVA INTRODUCTION	9 + 3

An overview of Java, data types, variables and arrays, operators, control statements, classes, objects, methods.

List of Experiments:

1. Simple Java applications
   - For understanding reference to an instance of a class (object), methods
   - Handling Strings in Java
   - Constructor in Java

UNIT – IV JAVA PROGRAMMING	9+3

Inheritance Packages and Interfaces, Exception handling Strings, Input /Output, Multithreading – interrupting threads – thread states – thread priorities – thread synchronization – Executors.

List of Experiments:

1. Simple Package creation.
   - Developing user defined packages in Java
2. Interfaces
   - Developing user-defined interfaces and implementation
   - Use of predefined interfaces
3. Exception Handling Mechanism in Java
   - Handling pre-defined exceptions
   - Handling user-defined exceptions

UNIT – V FILE HANDLING IN JAVA	9+3

Files - streams - byte streams, character streams, text input/output, binary input/output, random access file operations, File management using File class.

Connecting to a database, querying a database and processing the results, updating data with JDBC.

List of Experiments:

1. Program to implement streaming models
2. Program to implement JDBC Connectivity

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	-	30	75

TEXT BOOKS

1. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003
2. Bjarne Stroustrup, “The C++ programming language”, Addison Wesley, 2000
3. Herbet Schidt and Dale Srien, “Java Fundamentals - A comprehensive Introduction”, TMH.
4. Herbert Schildt, “The Complete Reference (Fully updated for jdk7)”, Oracle press 8th Edition, 2012.
5. Java for Programmers, P.J. Deitel and H.M. Deitel, Pearson education
6. Java: How to Program P.J. Deitel and H.M. Deitel, PHI.
7. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
8. Thinking in Java, Bruce Eckel, Pearson Education

REFERENCES

1. Ira Pohl, “Object oriented programming using C++”, Pearson Education Asia, 2003
2. John R.Hubbard, “Programming with C++”, Schaums outline series, TMH, 2003

3. E.Balagurusamy " Object Oriented Programming with C++", TMH 2/e
4. Cay S. Horstmann and Gary Cornel, "Core Java Programming Volume – I", 9th Edition, 2012.
5. Programming in Java, Bruce Eckel, Pearson Education
6. Programming in Java, S. Malhotra and S. Choudhary, Oxford Univ. Press.
7. Deitel & Deitel, "Java How to Program", Prentice Hall, 9th Edition, 2012.

E – REFERENCES

1. https://docs.oracle.com/javase/tutorial/java/
2. https://www.coursera.org/learn/java-programming
3. https://www.udemy.com/introduction-to-java-programming/
4. https://www.udemy.com/learn-java-programming-tutorial/

Mapping of COs with POs:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO7**	**PO 8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	3	3	3	3	3	2	2	2	1	0	0	2	3	3
CO2	3	3	3	3	3	2	2	2	1	0	0	2	3	3
CO3	2	2	2	3	3	3	2	2	1	0	0	1	2	2
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	13	12	13	14	12	7	8	8	5	0	0	5	11	10

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
Original	13	12	13	14	12	7	8	8	5	0	0	5	11	10
Scaled to 0,1,2,3 scale	3	3	3	3	3	2	2	2	1	0	0	1	3	2

COURSE CODE	COURSE NAME	L	T	P	C
XCS404	OPERATING SYSTEMS	3	1	1	5
C:P:A= 2.8:1.8:0.4					
		L	T	P	H
		3	2	2	7

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	A ***Describe*** the evolution of operating systems and the ***handle*** the system calls issues related to designing OS.	Cognitive Psychomotor	Describe, Apply
CO2	***Describe***, a**pply** the processes, inter-processes communication, and process synchronization and ***Solve*** the problems related to processes.	Cognitive Psychomotor Affective	Describe Create, Apply
CO3	***Identify*** and ***Describe and apply*** the main memory, secondary memory management techniques and ***Solve*** the memory management issues.	Cognitive Psychomotor Affective	Describe Create, Apply
CO4	***State*** and ***Describe*** the I/O functions	Cognitive	Knowledge
CO5	Understand and ***Describe*** the systems the basics of Linux system and perform administrative tasks on Linux Servers.	Cognitive	Apply

UNIT I OPERATING SYSTEMS OVERVIEW **12 + 6**

Theory

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System. Computer System Organization- Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

Practical

1. Write programs using the process related system calls of UNIX operating system like fork, exec, exit, wait, getuid, geteuid, close, kill etc...
2. Write C programs to simulate UNIX commands like ls, grep, etc…

UNIT II PROCESS MANAGEMENT **12 +12**

Processes-Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication; Threads- Overview, Multicore Programming, Multithreading Models; Windows 7 - Thread and SMP Management. Process Synchronization - Critical Section Problem, Mutex Locks, Semophores, Monitors; CPU Scheduling and Deadlocks.

Practical

3. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)
4. Simulate Inter Process Communication
5. Implement the various scheduling algorithms like FCFS and SJF scheduling, Priority and Round robin scheduling.
6. Implement the semaphores like Producer – Consumer problem

UNIT III STORAGE MANAGEMENT	12 + 6

Main Memory-Contiguous Memory Allocation, Segmentation, Paging, 32 and 64 bit architecture Examples; Virtual Memory- Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

Practical

7. Implement first fit algorithm for memory management scheme
8. Implement best fit algorithm for memory management scheme
9. Implement worst fit algorithm for memory management scheme
10. Implement the contiguous file allocation technique

UNIT IV I/O SYSTEMS	12 +3

Mass Storage Structure- Overview, Disk Scheduling and Management; File System Storage-File Concepts, Directory and Disk Structure, Sharing and Protection; File System Implementation - File System Structure, Directory Structure, Allocation Methods, Free Space Management; I/O Systems.

Practical

11. Simulate Storage Features using virtual box component

UNIT V CASE STUDY	12 +3

Linux System- Basic Concepts; System Administration-Requirements for Linux System Administrator, Setting up a LINUX Multifunction Server, Domain Name System, Setting Up Local Network Services; Virtualization- Basic Concepts, Setting Up Xen,VMware on Linux Host and Adding Guest OS.

Practical

12. System virtualization using Vmware.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	15	30	90

TEXT BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.

REFERENCES

1. William Stallings, "Operating Systems – Internals and Design Principles", 7thEdition, Prentice Hall, 2011.
2. D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Second Edition, Tata McGraw-Hill Education, 2007
3. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.
4. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education", 1996.

E-REFERENCES

1. NPTEL Course Prof. P.C.P. Bhatt, Department of Computer Science and Engineering, IISC, Bangalore.

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1	3	1	3	0	0	0	0	0	1	0	0	1	1	2
CO 2	3	3	3	1	0	0	0	0	0	0	1	2	1	3
CO 3	2	3	3	1	1	0	0	0	1	0	1	2	1	3
CO 4	3	2	0	1	1	1	1	0	1	0	0	2	0	3
CO 5	3	2	0	1	1	1	1	0	1	0	0	2	0	3
	14	11	9	4	3	2	2	0	4	0	2	9	3	14

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original value	14	11	9	4	3	2	2	0	4	0	2	9	3	14
Scaled to 0,1,2,3 scale	3	3	2	1	1	1	0	0	1	0	1	2	1	3

COURSE CODE	COURSE NAME	L	T	P	C
XCS405	DESIGN AND ANALYSIS OF ALGORITHMS	3	1	0	4
C:P:A = 3:0.8:0.2					
		L	T	P	H
		3	2	0	5

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Explain*** and ***classify*** the basic algorithms and their notion types with recursive and non-recursive.	Cognitive	Understand
CO2	Origination Analyses and ***designs*** of sorting and searching problems.	Cognitive	Analysis
CO3	***Apply*** Greedy and Dynamic Programming Techniques in various problems.	Cognitive	Applying
CO4	***Explain*** and ***apply*** algorithm techniques and find out their complexity through recursive and iterative method.	Cognitive	Understand
CO5	***Explain*** the limitations of algorithm power and design methods	Cognitive	Understand

UNIT I BASIC CONCEPTS OF ALGORITHMS **12**

Introduction - Notion of Algorithm - Fundamentals of Algorithmic Solving - Important Problem types - Fundamentals of the Analysis Framework - Asymptotic Notations and Basic Efficiency Classes-Mathematical Analysis of Non-recursive Algorithm: Examples-Mathematical Analysis of Recursive Algorithm :

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER **12**

Brute Force - Closest-Pair and Convex-Hull Problems-Exhaustive Search- Selection Sort and Bubble Sort - Sequential Search and Brute-force string matching- Divide and conquer : Merge sort - Quick Sort - Binary Search tree- Strassens Matrix Multiplication of large integers.

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE **12**

Computing a Binomial Coefficient - Warshalls and Floyd‟ algorithm - Optimal Binary Search Trees - Knapsack Problem and Memory functions. Greedy Technique- Prims algorithm-Kruskal's Algorithm- Dijkstra's Algorithm-Huffman Trees.

UNIT IV ITERATIVE ALGORITHMS **12**

Transform and conquer: Presorting - Balanced Search trees - AVL Trees - Heaps and Heap sort - The Simplex Method-The Maximum-Flow Problem - Maximum Matching in Bipartite Graphs

UNIT V LIMITATIONS OF ALGORITHM POWER AND DESIGN METHODS **12**

Lower- Bound arguments- Decision Trees- P, NP and NP-complete problems- coping with the Limitations - Backtracking - n-Queen's Problem - Hamiltonian Circuit problem - subset-Sum problem - Branch and bound - Assignment problem - Knapsack problem - Approximation Algorithms for NP - Hard Problems - Traveling salesman problem.

LECTURE	TUTORIAL	TOTAL
45	15	60

TEXT BOOKS

1. Anany Levitin, Introduction to the Design & Analysis of Algorithms, Addison Wesley, Boston, 3rd Edition, 2012. ISBN-13: 978-0-13-231681-1.

REFERENCES

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", PHI Pvt. Ltd., 2001
2. Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia, 2003.
3. A.V.Aho, J.E. Hopcroft and J.D.Ullman, "The Design and Analysis Of Computer Algorithms", Pearson Education Asia, 2003.

Mapping of COs with POs:

	PO 1	PO 2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2
CO1	2	3	2	1	0	0	0	0	0	0	0	0	1	2
CO2	2	3	2	2	1	0	0	0	0	0	0	0	1	1
CO3	2	2	2	0	1	0	0	0	0	0	0	0	1	1
CO4	2	2	2	2	0	0	0	0	1	0	0	0	1	1
CO5	2	2	2	2	0	0	0	0	1	0	1	0	1	1
	10	11	10	7	2	0	0	0	2	0	1	0	5	6

Courses	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Original	10	11	10	7	2	0	0	0	2	0	1	0	5	6
Scaled to 0,1,2,3 Scale	2	3	2	2	1	0	0	0	1	0	1	0	1	2

COURSECODE	COURSE NAME	L	T	P	C
XEE406	ECONOMICS FOR ENGINEERS	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Understand*** the concepts of economics in engineering	Cognitive	Remember
CO2	***Interpret*** Break-even analysis	Cognitive	Understand
CO3	***Illustrate*** value engineering procedure	Cognitive	Understand
CO4	***Understand*** *and* ***analyze*** replacement problem	Cognitive	Understand
CO5	***Explain*** 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 II BREAK-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

Social Cost Benefit Analysis: 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 years digits method of depreciation, sinking fund method of depreciation, Annuity method of depreciation, service output method of depreciation.

	LECTURE	TUTORIAL	TOTAL
	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. Panneer Selvam, 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 POs:

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

Total	11	4	0	5	0	7	3	1	0	2	8	6
Scaled to 0,1,2,3 scale	3	1	0	1	0	2	1	1	0	1	2	1

COURSE CODE	COURSE NAME	L	T	P	SS	C
XGS407	TECHNICAL COMMUNICATION	1	0	0	2	1
		L	T	P	SS	H
C:P:A	1.8:0.8:0.4	1	0	0	2	3

COURSE OUTCOMES		Domain	Level
CO 1	I***dentify*** the features of a technical project report and Knowledge on the linguistic competence to write a technical report	Cognitive	Remember
CO 2	I***ntegrate*** both technical subject skill and language skill to write a project.	Cognitive	Create
CO 3	Confidence to ***present*** a project in 10 to 15 minutes	Affective	Response
CO 4	The learner ***identifies*** and absorbs the pronunciation of sounds in English Language and learns how to mark the stress in a word and in a sentence properly	Cognitive	Remember
CO 5	***Enables*** the speaker speaks clearly and fluently with confidence and it trains the learner to listen actively and critically	Psychomotor	Perception

UNIT I BASIC PRINCIPLES OF GOOD TECHNICAL WRITING	9
Style in technical writing, out lines and abstracts, language used in technical writing: technical words, jargons etc	
UNIT IISPECIAL TECHNIQUES	**9**
used in technical writing: Definition, description of mechanism, Description of a process, Classifications, division and interpretation	
UNIT III REPORT/ PROJECT	**9**
Layout the formats: chapters, conclusion, bibliography, annexure and glossary, Graphics aids etc - Presentation of the written project 10 – 15 minutes	
UNIT IV SOUNDS OF ENGLISH LANGUAGE;	**9**
Reading for facts, meanings from context, scanning, skimming, inferring meaning, critical reading, active listening, listening for comprehension etc.	
UNIT V READING COMPREHENSION	**9**
Reading for facts, meanings from context, scanning, skimming, inferring meaning, critical reading, active listening, listening for comprehension etc.	

	LECTURE	SELF STUDY	PRACTICAL	TOTAL
HOURS	15	30	0	45

TEXT BOOKS

1. **Gordon H. Mills**, **Technical Writing** – April, 1978, Oxford Univ Press
2. Barun K. Mitra, Effective Technical Communication: A Guide for scientists and Engineers. Author, Publication: Oxford University press. 2007

REFERENCE BOOKS

1. Clifford Whitcomb, Effective Interpersonal and Task Communication Skills for Engineers, Atlantic Publishers. 2010

Software for lab: English Teaching software (Young India Films**)**

Mapping of COs with GAs:

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

V SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
XMA 501	NUMERICAL METHODS	2	1	0	3
C:P:A = 2.75:0.25:0					
		L	T	P	H
		2	2	0	4

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Solve*** algebraic and transcendental equations and to ***Compute*** Eigen values of a matrix by Power method.	Cognitive	Apply
CO2	***Interpret*** *and* Approximate the data using Interpolation methods.	Cognitive	Create ,Apply
CO3	***Compute*** the Numerical Differentiation and Integration *and to* ***Apply the*** Trapezoidal and Simpson's rules.	Cognitive	Apply
CO4	***Solve*** the first order and second order differential equations using single step and multistep methods.	Cognitive	Apply
CO5	***Apply*** Finite difference methods to ***Solve*** two-point linear boundary value problems and to ***Solve*** One dimensional heat-flow equation and wave equation.	Cognitive	Create ,Apply

UNIT I Solution of Equations and Eigenvalue Problems **12**

Solution of algebraic and transcendental equations - Fixed point iteration method – Newton-Raphson method- Solution of linear system of equations - Gauss Elimination method –Gauss-Jordan methods – Iterative methods of Gauss-Jacobi and Gauss-Seidel – Matrix Inversion by Gauss-Jordan method – Eigen values of a matrix by Power method.

UNIT II Interpolation And Approximation **12**

Interpolation with equal intervals - Newton's forward and backward difference formulae- Interpolation with unequal intervals - Lagrange interpolation – Newton's divided difference interpolation

UNIT III Numerical Differentiation And Integration **12**

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 and Simpson's 3/8 rules – Romberg's method - Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's rules.

UNIT IV Initial Value Problems for Ordinary Differential Equations **12**

Single step-methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first and second order equations - Multi-step methods - Milne's and Adams-Bashforth predictor-corrector methods for solving first order equations.

UNIT V Boundary Value Problems in Ordinary and Partial Differential Equations **12**

Finite difference methods for solving two-point linear boundary value problems – Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit methods - One dimensional wave equation by explicit method.

	LECTURE	TUTORIAL	TOTAL
	30	30	60

TEXT BOOKS

1. Grewal, B.S. and Grewal,J.S., " Numerical methods in Engineering and Science", 6th Edition, Khanna Publishers, New Delhi, (2004).
2. Sankara Rao, K. "Numerical methods for Scientists and Engineers', 3rd Edition, Prentice Hall of India Private Ltd., New Delhi, (2007).

REFERENCES

1. Chapra, S. C and Canale, R. P. "Numerical Methods for Engineers", 5th Edition, Tata McGraw-Hill, New Delhi, (2007).
2. Gerald, C. F. and Wheatley, P. O., "Applied Numerical Analysis", 6th Edition, Pearson Education Asia, New Delhi, (2006).
3. Brian Bradie, "A friendly introduction to Numerical analysis", Pearson Education Asia, New Delhi, (2007)
4. Jain M.K. , Iyengar S.R.K, Jain R.K, "Numerical Methods problems and solutions", Revised Second Edition (2007).

E REFERENCES

1. www.nptel.ac.in
2. Elementary Numerical Analysis Prof. Rekha P. Kulkarni. Department of Mathematics, Indian Institute Of Technology, Bombay.

Mapping of COs with POs:

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

Total	15	4	0	0	2	0	0	0	0	5	2	5
Scaled	3	1	0	0	1	0	0	0	0	1	1	1

COURSE CODE	COURSE NAME	L	T	P	C
XCS502	THEORY OF COMPUTATION	2	1	0	3
C:P:A = 3:0:0					
		L	T	P	H
		2	2	0	4

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	Explain and Fundamental of the basic kinds of finite automata and their capabilities	Cognitive	Knowledge
CO2	Describe regular and context-free languages	Cognitive	Knowledge
CO3	Describe transform regular expressions to grammars	Cognitive and Affective	Knowledge, Create
CO4	Explain Constructions of Turing Machines	Cognitive	Knowledge,
CO5	Describe the key results in algorithmic complexity, computability.	Cognitive and Affective	Knowledge, Create

UNIT I FINITE AUTOMATA **9**

Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with €-moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA's with and without €-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**

Undecidability- 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

TEXT BOOKS
1. Hopcroft J.E., Motwani R. and Ullman J.D, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2008.
REFERENCES
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.
E-REFERENCES
Theory of Computation by Prof. Somenath Biswas, Computer Science and Engineering, IIT Kanpur

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	2	2	2	3	0	0	0	1	1	1	0	0	0	0
CO2	2	3	2	3	0	0	0	0	0	1	0	2	2	1
CO3	2	2	3	1	1	2	1	2	2	0	0	0	0	2
CO4	3	2	2	2	0	0	0	0	0	1	0	1	0	2
CO5	1	1	3	3	1	2	1	1	1	0	0	2	2	2
Total	10	10	12	12	2	4	2	4	4	3	0	5	4	11

Courses	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Original	10	10	12	12	2	4	2	4	4	3	0	5	4	11
Scaled to 0,1,2,3 Scale	2	2	3	3	1	1	1	1	1	1	0	1	1	3

COURSE CODE	COURSE NAME	L	T	P	C
XCS 503	DATABASE MANAGEMENT SYSTEMS	3	0	1	4
C:P:A = 2.8:0.8:.0.4					
		L	T	P	H
		3	0	2	5

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Construct*** queries with relational database system with the basics of SQL	Cognitive	Remember, Create
CO2	***Relate and Apply*** the design principles for logical design of databases, including ER model and normalization approach	Cognitive	Understand, Apply
CO3	***Define and Explain***the basic database storage structures and access techniques: file and page organizations, indexing methods including B-tree, B+ tree andhashing.	Cognitive	Remember, Understand
CO4	***Define and Explain the*** basic issues of transaction processing and concurrency control.	Cognitive	Remember , Understand
CO5	**work** successfully in a team by design and development of database application systems.	Cognitive	Apply

UNIT I INTRODUCTION **9+3**

Introduction to File and Database systems- Database system structure – Data Models – Types of Data models – ER model – Relational Model – Keys – Relational Algebra and Calculus.

List of Experiments:

1. Database design using E-R model and Normalization

UNIT II RELATIONAL MODEL **9+21**

SQL – Data definition- Queries in SQL- Updates- Views – Integrity and Security – Relational Database design – Functional dependences and Normalization for Relational Databases – Decomposition - Desirable Properties of Decomposition - Boyce-Codd Normal Form.

List of Experiments:

2. Data Definition Language (DDL) commands in RDBMS
3. Data Manipulation Language (DML) and Data Control Language (DCL)
4. High level language extensions with cursors
5. High level language extension with Triggers
6. Views
7. Procedures and Functions
8. Embedded SQL

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+6**
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.	

List of Experiments:

1. Develop the following applications using Mysql and Java
    a. Design and implementation of payroll processing system
    b. Design and implementation of Banking system
    c. Design and implementation of Library Information System
    d. Design and implementation of Student Information System

LECTURE	PRACTICAL	TOTAL
45	30	75

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth and S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata Mc Graw Hill, 2011.
2. C.J.Date, A.Kannan and S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

REFERENCES

1. Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education, 2008.
2. Atul Kahate, “Introduction to Database Management Systems”, Pearson Education, New Delhi, 2006.
3. Alexis Leon and Mathews Leon, “Database Management Systems”, Vikas Publishing House Private Limited, New Delhi, 2003.
4. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, Tata Mc Graw Hill, 2010.
5. G.K.Gupta, “Database Management Systems”, Tata Mc Graw Hill, 2011.
6. Rob Cornell, “Database Systems Design and Implementation”, Cengage Learning, 2011.

E-RESOURCES

1. http://spoken-tutorial.org
2. http://vlab.co.in/

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	3	0	2	1	0	0	0	0	0	0	0	0	3	1
CO 2	3	2	1	1	0	0	0	0	0	0	0	0	3	1
CO 3	3	0	0	0	0	0	0	0	0	0	0	0	3	1
CO 4	3	0	0	0	0	0	0	0	0	0	0	0	3	1
CO 5	0	3	3	3	2	0	0	0	2	1	0	0	3	3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O 1	PS O 2
Original	12	5	6	5	2	0	0	0	2	1	0	0	15	7
Scaled to 0,1,2,3 scale	3	1	2	1	1	0	0	0	1	1	0	0	3	2

COURSE CODE	COURSE NAME	L	T	P	C
XCS504	WEB TECHNOLOGY AND MOBILE APPLICATION DEVELOPMENT	3	1	1	5
C:P:A = 2.7:1.7:0.6		L	T	P	H
		3	2	2	7

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	The history of the internet and related internet concepts that are vital in ***understanding*** Web development.	Cognitive	Remember
CO2	***Demonstrate*** the important HTML tags for designing static and dynamic web pages and separate design from content using Cascading Style sheet.	Cognitive	Remember Apply
CO3	***Discuss*** the insights of server side programming and implement complete application over the web.	Cognitive Psychomotor Affective	Understand Apply Set Respond
CO4	***Utilize*** the concepts of XML and Java.	Cognitive	Understand Apply
CO5	***Use*** mobile application development software tools i.e. Android, Windows and phy mobile technologies and etc. and identify the environments currently available on the market to ***design*** mobile application development	Cognitive Psychomotor Affective	Understand Guided Respond

UNIT I INTRODUCTION **9 +3**

Internet standards – TCP,UDP, SMTP and POP3 protocols – URLs – CGI-Internet Address – protocol handlers – content handlers - Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices. Small Computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants.

List of Experiments:

1. Write programs in Java using sockets to implement the following:
    - HTTP request
    - FTP
    - SMTP
    - POP3

UNIT II CLIENT SIDE TECHNOLOGY **9+3**

HTML – forms – frames – tables – web page design – static and dynamic-JavaScript introduction – control structures – functions – arrays – objects – simple web applications. Dynamic HTML – introduction – cascading style sheets – object model and collections – event model – filters and transition – data binding – data control – ActiveX control – handling of multimedia data.

List of Experiments:

2. Create web pages with the followings
    - HTML
    - Style sheet languages
    - JavaScript
    -

UNIT III SERVER SIDE TECHNOLOGY	**9+6**

HTTP GET and POST requests -Web server (Java web server / Tomcat / JBoss) – data base connectivity – Servlets -Life cycle – deployment of simple servlets –JSP — session tracking – cookies –XAMPP - simple web applications – multi-tier applications.

List of Experiments:

3. Write a Java Servlets program for email registration form and do form validation using JavaScript.
4. Write programs in Java Servlet to do the following.
   i. Set the URL of another server.
   ii. Download the homepage of the server.
   iii. Display the contents of home page with date, content type, and Expiration date. Last modified and length of the home page.
5. Write a JSP program for simple user authentication process (user name, password).

UNIT IV XML AND WEB SERVICES	**9+3**

XML –benefits-Advantages of XML over HTML,EDI,Databases-XML based standards-Structuring with schemas-DTD-XML Schemas-XML processing-Components of e-business XML systems-ebXML-RosettaNet-Applied XML in vertical industry-Web services for mobile devices.

List of Experiments:

6. Developing a simple Calculator using Java Web service

UNIT V MOBILE APPLICATION DEVELOPMENT	**9+15**

J2ME Architecture, Small Computing Device Requirements, Run-Time Environment, MIDlet Programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME Wireless Toolkit - J2ME User Interfaces - High-Level Display - Low-Level Display - Record Management System - Generic Connection Framework

List of Experiments:

7.Installation of J2ME (Java Wireless Toolkit)
8. Developing an Android application for temperature conversion that is Celsius to Fahrenheit.
9.Creating an Android Application for Library Management System with Multiple 10.Activities and a Simple Menu using List View
11. Creating an Android Application of simple audio player.
12. Creating an Android Application to display the current location using Google Maps
13. Creating an Android Application to display the current temperature using sensors.

	LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
	45	**15**	**15**	**75**

TEXT BOOKS

1. Deitel and Nieto, “Internet and World Wide Web – How to program”, Pearson Education Publishers, 2000.2. W. Bolton Programmable Logic controllers-Newnes,2009

2. Elliotte Rusty Harold, “Java Network Programming”, O’Reilly Publishers, 2002.
3. Ron Schmelzer et al.”XML and Web Services”,Pearson Education,2002.
4. J2ME: The Complete Reference, James Keogh, Tata McGrawHill.
5. J2EE: The Complete Reference, Jim Keof, Tata McGrawHill.
6. Web Technology: A Developer’s Perspective, By N. P. Gopalan, J.Akilandeswari, 2011.

REFERENCES

1. R.Krishnamoorthy & S.Prabhu, “Internet and Java Programming”, New Age International Publishers, 2004.
2. Thomno A. Powell, “The Complete Reference HTML and XHTML”, fourth edition, Tata McGraw Hill, 2003.
3. Naughton, “The Complete Reference – Java2”, Tata McGraw-Hill, 3rd edition, 1999.
4. Enterprise J2ME: Developing Mobile Java Applications – Michael Juntao Yuan, Pearson Education, 2004.
5. Beginning Java ME Platform, Ray Rischpater, Apress, 2009
6. Beginning J2ME: From Novice to Professional, Third Edition, Sing Li, Jonathan B. Knudsen, Apress, 2005.
7. Kicking Butt with MIDP and MSA:Creating Great Mobile Applications,1st edition,J.Knudsen,Pearson.

E REFERENCES

1. https://www.w3.org/
2. http://www.w3schools.com/
3. http://www.e-bros.fi/en/mobile_development.html

Mapping of COs with POs:

	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
CO 1	1	3	0	0	0	0	0	0	0	0	0	0	1	0
CO 2	1	3	0	0	0	0	0	0	0	0	0	0	2	0
CO 3	1	3	0	1	1	0	0	0	0	0	0	0	3	0
CO 4	1	3	0	2	0	0	0	0	0	0	0	0	1	0
Total	4	12	0	3	1	0	0	0	0	0	0	0	6	0

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
Origin al	4	12	0	3	1	0	0	0	0	0	0	0	6	0
Scaled to 0,1,2,3 scale	1	3	0	1	1	0	0	0	0	0	0	0	2	0

COURSE CODE	COURSE NAME	L	T	P	C
XTQ506	TOTAL QUALITY MANAGEMENT	3	0	0	3
C:P:A = 3: 0: 0		L	T	P	H
		3	0	0	3

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

UNIT I INTRODUCTION **9**

Definition of quality – Dimensions of quality – Quality planning – Quality costs – Analysis techniques for quality costs – Basic concepts of Total Quality Management – Historical review –Principles of TQM – Leadership – Concepts – Role of senior management – Quality Council –Quality statements – Strategic planning – Deming philosophy – Barriers to TQM implementation

UNIT II TQM PRINCIPLES **9**

Customer satisfaction – Customer perception of quality – Customer complaints – Service quality –Customer retention – Employee involvement – Motivation, empowerment, teams, recognition and reward – Performance appraisal – Benefits – Continuous process improvement – Juran trilogy – PDSA cycle – 5S – Kaizen – Supplier partnership – Partnering – Sourcing – Supplier selection – Supplier rating – Relationship development – Performance measures – Basic concepts – Strategy – Performance measure.

UNIT III STATISTICAL PROCESS CONTROL (SPC) **9**

The seven tools of quality – Statistical fundamentals – Measures of central tendency and dispersion – Population and sample – Normal curve – Control charts for variables and attributes – Process capability – Concept of six sigma – New seven management tools.

UNIT IV TQM TOOLS **9**

Benchmarking – Reasons to benchmark – Benchmarking process – Quality Function Deployment (QFD) – House of quality – QFD process – Benefits – Taguchi quality loss function – Total Productive Maintenance (TPM) – Concept – Improvement needs – FMEA – Stages of FMEA.

UNIT V QUALITY SYSTEMS **9**

Need for ISO 9000 and other quality systems – ISO 9000:2000 quality system – Elements – Implementation of quality system – Documentation – Quality auditing – TS 16949 – ISO 14000 –Concept, requirements and benefits.

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS

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

REFERENCES

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

E- REFERENCES

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

CO Vs GA Mapping

	CO1	CO2	CO3	CO4	CO5	Total	Scaled Down 0 t0 5
GA1	2	1	2	1	1	7	2
GA4	1	1	2	2	1	7	2
GA5	1	1	2	2	1	7	2
GA6	1	1	2	1	2	7	2
GA7	1	1	1	1	1	5	1
GA8	1	1	1	2	2	7	2
GA9	1	1	1	-	1	4	1
GA10	1	1	1	2	2	7	2
GA12	1	1	-	-	2	4	1

COURSE CODE	XGS507	L	T	P	C
COURSE NAME	BUSINESS COMMUINCATION	1	0	1	0

		L	T	P	C
C:P:A	**1:1:0**	**1**	**0**	**2**	**3**

COURSE OUTCOMES:		**Domain**	**Level**
CO 1	To choose and apply different styles to various forms of business communication.	Cognitive	Remember
CO 2	Identify the proper tone of language required in writing and speaking in business communication.	Cognitive	Understand
CO 3	Display knowledge on grammar and other linguistic features in writing various forms of business communication.	Cognitive	Understand
CO 4	To distinguish between letters and memos and various forms of Business Communication.	Psychomotor	Guided Response
CO 5	Learn how to write business reports, minutes, proposals.	Psychomotor	Apply

UNIT IINTRODUCTION TO BUSINESS COMMUNICATION	
Modern developments in the style of writing letters memos and reports: block letters, semi block letters, full block letters, simplified letters etc.,	**5**
UNIT IIUSE OF LANGUAGE	
Memos/minutes/telephone memos/ letters/ assignments art of writing E-mail etc. Advantages of written and spoken communication.	**5**
UNIT IIIGRAMMAR	
The use of active and passive voice; the use of grammar, propriety, accuracy, exactness, the tone & other elements of language used in these writings.	**5**
UNIT IVTYPES OF REPORTS	
The format of various types of Reports/ projects etc.,	**5**
UNIT VBUSINESS WRITING	
Writing Business reports, proposals and minutes.	**10**

	SELF-STUDY	**TOTAL**
	30	30

TEXT BOOKS

1. John Sealy, Writing and Speaking Author:, Oxford University Press, New Delhi Third Edition 2009.
2. Williams K S, Communicating in Business (8th Edition) Engage Learning India Pvt. Ltd.; 2012

REFERENCES

1. John Sealy, Writing and Speaking, Oxford University Press, New Delhi Third Edition 2009.

Mapping of COs with GAs

	GA1	**GA2**	**GA3**	**GA4**	**GA5**	**GA6**	**GA7**	**GA8**	**GA 9**	**GA 10**	**GA 11**	**GA 12**
CO1										**2**		
CO2										**2**		
CO3				**2**						**1**		
CO4												

CO5										**1**		
Total				**2**						**6**		
Scaled Value				**1**						**2**		

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

XCS508 INPLANT TRAINING – II

C:P:A = 2:2:2

CO Vs GA Mapping

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
CO1	2	0	0	0	0	0	0	0	0	0	0	0
CO2	0	0	0	0	0	0	1	3	0	0	1	0
CO3	0	0	0	0	0	0	0	0	3	1	3	1
CO4	0	1	2	1	3	0	0	0	0	0	0	3
CO5	0	0	0	3		0	0	0	0	3	0	1
Total	2	1	2	4	3	0	1	3	3	4	4	5

Total	2	1	2	4	3	0	1	3	3	4	4	5
Scaled	1	1	2	1	1	0	1	1	1	1	1	1

COURSE OUTCOMES		Domain	Level
CO1	***Relate*** classroom theory with workplace practice	Cognitive	Understand
CO2	***Comply with*** Factory discipline, management and business practices.	Affective	Respond
CO3	D***emonstrates*** teamwork and time management.	Affective	Value
CO4	***Describe*** and ***Display*** hands-on experience on practical skills obtained during the programme.	Psychomotor	Perception, Set
CO5	***Summarize*** the tasks and activities done by technical documents and oral presentations	Cognitive	Knowledge, Analysis

VI SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
XCS602	DATA WAREHOUSING AND DATA MINING	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Design*** a data mart or data warehouse for any organization	Cognitive	Remember
CO2	***Develop*** skills to write queries using DMQL	Cognitive	Remember Understand
CO3	***Apply*** and extract knowledge using data mining techniques	Cognitive	Remember
CO4	***Adapt*** to new data mining tools	Cognitive	Remember Understand
CO5	***Explain*** the recent trends in data mining such as web mining, spatial-temporal mining	Cognitive	Understand

UNIT I INTRODUCTION **9**

Definition of Data Mining - Data Mining Vs Query Tools – Machine Learning –Taxonomy of Data Mining Tasks – Steps in Data Mining Process – Overview of Data Mining techniques.

UNIT II DATA WAREHOUSING **9**

Definition – Multidimensional Data Model – Data Cube – Dimension Modeling – OLAP Operations – Warehouse Schema – Data Warehouse Architecture – Data Mart – Meta Data – Types of Meta Data – Data Warehouse Backend Process – Development Life Cycle.

UNIT III DATA PRE-PROCESSING AND CHARACTERIZATION **9**

Data Cleaning – Data Integration and Transformation – Data Reduction – Discretization and Concept Hierarchy Generation – Primitives – Data Mining Query Language – Generalization – Summarization – Analytical Characterization and Comparison - Association Rule – Mining Multi Dimensional data from Transactional Database and Relational Database.

UNIT IV CLASSIFICATION **9**

Classification – Decision Tree Induction – Bayesian Classification – Prediction –Back Propagation – Cluster Analysis – Hierarchical Method – Density Based Method – Grid Based Method – Outlier Analysis.

UNIT V ADVANCED TECHNIQUES AND APPLICATIONS **9**

Knowledge Mining - Web Mining - Spatial Mining - Temporal Mining- Tools – Applications – Case Study (at least two).

LECTURE	TUTORIAL	TOTAL
45	-	45

TEXT BOOKS

1. Paulraj Ponnaiah, “Data Warehousing Fundamentals”, Wiley Publishers, 2001.
2. Jiawei Han, Micheline Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufman Publishers, 2000.

REFERENCES

1. Usama M.Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth, Ramasamy Uthurusamy, "Advances in Knowledge Discovery and Data Mining", The M.I.T. Press, 1996.
2. Ralph Kimball, Margy Ross, "The Data Warehouse Toolkit", John Wiley and Sons Inc., 2002.
3. Alex Berson, Stephen Smith, Kurt Thearling, "Building Data Mining Applications for CRM", Tata McGraw Hill, 2000.

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
CO 1	2	0	3	3	2	0	0	0	0	0	0	0	1	0
CO 2	2	0	0	2	2	0	3	0	0	0	0	0	1	0
CO 3	3	0	0	3	0	0	0	0	0	0	0	0	1	0
CO 4	2	0	2	2	3	0	0	0	0	0	0	0	1	2
CO 5	2	0	0	0	0	0	0	1	0	0	0	0	1	0
	11	0	5	10	7	0	3	1	0	0	0	0	5	2

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
ORIGINAL	11	0	5	10	7	0	3	1	0	0	0	0	5	2
SCALED TO 0,1,2,3 SCALE	3	0	1	2	2	0	1	1	0	0	0	0	1	1

COURSE CODE	COURSE NAME	L	T	P	C
XCS603	CLOUD COMPUTING	3	0	1	4
C:P:A= 3:0.75:0.25					
		L	T	P	H
		3	0	2	5

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe and understand the*** idea of evolution of cloud computing and its services available today.	Cognitive	Describe, Understand
CO2	***Describe***, ***Ability to*** d***evelop, classify and analyze*** components of cloud computing and its business perspective	Cognitive Psychomotor Affect	Describe Create, Analyze
CO3	***Describe***, ***apply, analyze*** and **evaluate** the various cloud development tools.	Cognitive Psychomotor Affect	Describe Create, Apply
CO4	***Explain, Analyze***, Demonstrate knowledge on services, architecture, types of infrastructural models, disaster recovery and Virtualization	Cognitive Psychomotor Affect	Describe Create, evaluate Apply
CO5	***Understand, Explain, develop and analyze*** the case studies to derive the best practice model to apply when developing and deploying cloud based applications.	Cognitive Psychomotor Affect	Describe Create, Apply

UNIT-I **CLOUD COMPUTING FUNDAMENTALS** **9+ 3**

Understanding Cloud Computing: Origins and Influences, Basic Concepts and Terminology, Goals and Benefits, Risks and Challenges. Types of cloud, Cloud services: Benefits, challenges and issues of cloud computing, Evolution of Cloud Computing, usage scenarios and Applications - Fundamental Concepts and Models: Roles and Boundaries, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models.

List of Experiments:

1. Study of Cloud Computing & Architecture.

UNIT –II **CLOUD COMPUTING MECHANISMS AND ARCHITECTURE** **9 + 3**

Cloud-Enabling Technology: Broadband Networks and Internet Architecture, Data Center Technology, Virtualization Technology, Web Technology, Multitenant Technology, Service Technology. Fundamental Cloud Architectures: Architecture - Workload Distribution, Resource Pooling, Dynamic Scalability, Elastic Resource Capacity, Service Load Balancing, Cloud Bursting, Elastic Disk Provisioning, Redundant Storage..

List of Experiments:

2. Study and implementation of Infrastructure as a Service using Quanta Plus /Aptana /Kompozer.

UNIT-III **CLOUD SERVICES AND FILE SYSTEM** **9 + 3**

Software as a Service - Platform as a Service – Infrastructure as a Service - Database as a Service - Monitoring as a Service – Communication as services. Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force. Introduction to Map Reduce, GFS, HDFS, Hadoop Framework.

List of Experiments:

3. Case study on Amazon EC2.
4. Case study on Microsoft azure.

UNIT -IV **WORKING WITH CLOUDS** **9+3**

Cloud Delivery Model Considerations: Cloud Delivery Models: The Cloud Provider, Cloud Delivery Models: The Cloud Consumer, Case Study Example. Cost Metrics and Pricing Models: Business Cost Metrics, Cloud Usage Cost Metrics, Cost Management - Considerations Email Communication over the Cloud - CRM Management

List of Experiments:

5. Study and installation of Storage as Service(SaaS).
6. Implementation of identity management using OpenStack.
7. Study and implementation of Single-Sing-On (JOSSO).

UNIT - V **VIRTUALIZATION FOR CLOUD AND SECURITY IN THE CLOUD** **9+3**

Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization –System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V - Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security

List of Experiments:

8. Virtualization in Cloud using Vmware and KVM.
9. Securing Servers in Cloud.

	LECTURE	**PRACTICAL**	**TOTAL**
	45	**15**	**60**

TEXT BOOKS

1. Thomas Erl and RicardoPuttini "Cloud Computing- Concepts, Technology & Architecture," Pearson, 1st edition 2013.
2. Cloud Computing ”A Practical Approach” Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGraw-Hill.
3. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, “Distributed and Cloud Computing, From Parallel Processing to the Internet of Things”, Morgan Kaufmann Publishers, 2012.
4. John W.Rittinghouse and James F.Ransome, “Cloud Computing: Implementation, Management, and Security”, CRC Press, 2010.
5. James E Smith, Ravi Nair, “Virtual Machines”, Morgan Kaufmann Publishers, 2006.

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1. Barrie Sosinsky, "Cloud Computing Bible," Wiley India Pvt Ltd, 1st edition, 2011.
2. Rajkumar Buyya, James Broberg and Andrzej Goscinski, "Cloud computing principles and paradigms," john Wiley and sons, 2011.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, “Cloud Computing, A Practical Approach”, TMH, 2009. Kumar Saurabh, “Cloud Computing – insights into New - Era Infrastructure”, Wiley India,2011
4. Haley Beard, “Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing”, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008

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1. http://cloud-standards.org/wiki/index.php?title=Main_Page
2. webpages.iust.ac.ir/hsalimi/.../89.../Cloud%20Common%20standards.pptop

ennebula.org,
3. www.cloudbus.org/cloudsim/, http://www.eucalyptus.com/
4. hadoop.apache.org
5. http://hadoop.apache.org/docs/stable/hdfs_design.html
6. http://static.googleusercontent.com/external_content/untrusted_dlcp/research.google.com/ en//archive/mapreduce-osdi04.pdf

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1	1	2	2	0	0	0	0	0	0	0	0	2	2	1
CO 2	0	3	0	2	2	1	3	0	0	0	0	0	3	1
CO 3	3	0	3	0	0	0	0	0	2	0	3	3	1	3
CO 4	3	0	3	0	1	3	0	1	2	0	3	3	3	3
CO 5	0	3	0	0	2	0	1	0	0	1	0	0	3	0
	7	8	8	2	5	4	4	1	4	1	6	8	12	8

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Original value	7	8	8	2	5	4	4	1	4	1	6	8	12	8
Scaled to 0,1,2,3 scale	2	3	3	1	1	1	1	1	1	1	2	3	4	3

COURSECODE	COURSE NAME	L	T	P	C
XCS604	PRINCIPLES OF COMPILER DESIGN	3	1	1	5
C:P:A = 2.8:0.8:0.4					
		L	T	P	H
		3	2	2	7

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the compilers and its construction tools and specification of tokens.	Cognitive	Knowledge,
CO2	***Describe*** and ***apply*** various parsing techniques for parsing the string.	Cognitive, Psychomotor	Knowledge, Analysis
CO3	***Illustrate*** and ***construct*** intermediate language**.**	Cognitive, Psychomotor	Knowledge, Response
CO4	***Describe*** **t**he code generation and ***make use of*** code generator to generate target code.	Cognitive, Psychomotor	Knowledge, Analysis
CO5	***Explain*** code optimization and **apply** the optimization technique.	Cognitive, Psychomotor	Knowledge, Analysis

UNIT I INTRODUCTION TO COMPILING **12+ 6**

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.

List of Programs

1. Construction of NFA
2. Construction of Minimized DFA
3. Implementation of Lexical Analyzer Using LexTool.
4. Generation of Tokens for Given Lexeme.
5. Conversion of Infix to Postfix Expression
6. Implementation of Symbol Table

UNIT II SYNTAX ANALYSIS **12 +6**

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.

List of Programs

7. Syntax Analysis using YACC.
8. Implementation of Shift Reduce Parsing Algorithm.
9. Construction of LR Parsing Table.
10. Construction of Operator Precedence Parse Table.

UNIT III INTERMEDIATE CODE GENERATION **12 + 6**

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.

List of Programs

11.Implementation of Quadruples
12. Implementation of Triples.
13. Implementation of Intermediate Code Generation.

UNIT IV CODE GENERATION **12+ 6**

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.

List of Programs

14. Implementation of Code Generation

UNIT V CODE OPTIMIZATION AND RUN TIME ENVIRONMENTS **12+ 6**

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.

List of Programs

15.Implementation of Code Optimization Techniques

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	15	30	90

TEXT BOOKS

1. Alfred V.Aho, Jeffrey D.Ullman, Ravi Sethi, "Compilers- Principles, Techniques, and Tools(Second Edition)", Pearson Education India, 2008.

REFERENCES

1. Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2003.
2. C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003.
3. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw-Hill, 2003.
4. Henk Alblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI, 2001.
5. Kenneth C. Louden, "Compiler Construction: Principles and Practice", Thompson Learning, 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 COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	3	2	3	2	1	0	0	2	1	0	2	3	2
CO 2	2	3	2	3	2	1	0	0	2	1	0	1	3	2
CO 3	1	3	3	2	1	1	0	0	1	1	0	2	3	2
CO 4	2	2	2	2	2	1	0	0	1	1	0	1	3	2
CO 5	2	3	3	1	1	1	0	0	1	1	0	1	3	2
Total	4	13	12	11	8	5	0	0	7	5	0	7	15	10

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original value	4	13	12	11	8	5	0	0	7	5	0	7	15	10
Scaled to 0,1,2,3 scale	1	3	3	3	2	1	0	0	2	1	0	2	3	2

COURSECODE	COURSE NAME	L	T	P	C
XCS605	DIGITAL SIGNAL PROCESSING	3	1	0	4
C:P:A = 3:0:0					
		L	T	P	H
		3	2	0	5

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	To ***classify*** and ***describe*** the basics of discrete time signals and Systems and **analyze** using tools	Cognitive	Comprehension, Knowledge, Analysis
CO2	To **apply** z-transform, DFT and FFT to **analyze** and **design** the DSP systems.	Cognitive	Application, Analysis, Synthesis
CO3	To **analyze** and **design** the IIR digital filters.	Cognitive	Analysis, Synthesis
CO4	To **analyze** and **design** the FIR digital filters.	Cognitive	Analysis, Synthesis
CO5	To **apply** signal processing for complex DSP application **designs**	Cognitive	Application, Synthesis

UNIT I SIGNALS AND SYSTEMS	**12**
Basic elements of digital signal Processing –Concept of frequency in continuous time and discrete time signals –Sampling theorem –Discrete time signals. Discrete time systems – Analysis of Linear time invariant systems –Z transform – Convolution and correlation.	
UNIT II FAST FOURIER TRA NSF ORMS	**12**
Introduction to DFT – Efficient computation of DFT Properties of DFT – FFT algorithms – Radix-2 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms – Use of FFT algorithms in Linear Filtering and correlation.	
UNIT III IIR FILTER DESIGN	**12**
Structure of IIR – System Design of Discrete time IIR filter from continuous time filter – IIR filter design by Impulse Invariance. Bilinear transformation – Approximation derivatives – Design of IIR filter in the Frequency domain.	
UNIT IV FIR FILTER DESIGN	**12**
Symmetric & Antisymmteric FIR filters – Linear phase filter-– Windowing technique – Rectangular- Kaiser windows – Frequency sampling techniques – Structure for FIR systems.	
UNIT V FINITE WORD LENGTH EFFECTS	**12**
Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representation – comparison – over flow error – truncation error – co-efficient quantization error - limit cycle oscillation – signal scaling – analytical model of sample and hold operations – Application of DSP – Model of Speech Wave Form – Vocoder.	

	LECTURE	TUTORIAL	TOTAL
	45	15	60

TEXT BOOKS
1. John G Proakis and Dimtris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", PHI/Pearson Education, 2000, 3rd Edition.
REFERENCES
1. Alan V Oppenheim, Ronald W Schafer and John R Buck, "Discrete Time Signal Processing", PHI/Pearson Education, 2000, 2nd Edition. 2. Johny R.Johnson, "Introduction To Digital Signal Processing", Prentice Hall Of India/Pearson Education, 2002. 3. Sanjit K.Mitra, "Digital Signal Processing: A Computer – Based Approach", Tata McGraw-Hill, 2001, Second Edition.
E REFERENCES
1. http://www.nptelvideos.in/2012/12/

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	3	3	2	1	2	1	0	0	0	0	1	0	3	2
CO2	3	3	3	3	2	1	0	0	0	0	1	0	3	2
CO3	1	3	3	2	1	1	0	0	0	0	1	0	3	2
CO4	1	3	3	1	1	1	0	0	0	0	1	0	3	2
CO5	3	1	3	2	1	1	0	0	0	0	1	0	3	2
	11	13	14	9	8	5	0	0	0	0	5	0	15	10

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Original value	11	13	14	9	8	5	0	0	0	0	5	0	15	10
Scaled to 0,1,2,3 scale	3	3	3	2	2	1	0	0	0	0	1	0	3	2

COURSE CODE	COURSE NAME	L	T	P	C
XES607	ENVIRONMENTAL STUDIES	3	0	0	0
C:P:A = 2.5: 0 : 0.5					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the significance of natural resources and ***explain*** anthropogenic impacts.	Cognitive	Understand Remember,
CO2	***Illustrate*** the significance of ecosystem and biodiversity for maintaining ecological balance	Cognitive	Knowledge,
CO3	***Identify*** the facts, consequences, preventive measures of major pollution and ***Recognize*** the disaster phenomenon	Cognitive	Remember, Recognize
CO4	***Explain*** the socio- economics, policy dynamics and ***practice*** the control and Anal measures of global issues for sustainable development.	Cognitive	Knowledge, Analysis
CO5	***Recognize*** the impact of population and ***apply*** the concept to develop various and App welfare programs.	Cognitive	Knowledge, Analysis

UNIT - I INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY **9**

Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

UNIT - II ECOSYSTEMS AND BIODIVERSITY **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 ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT – III ENVIRONMENTAL POLLUTION **12**

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 – Soil waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: flood, earthquake, cyclone and landslide.

UNIT –IV SOCIAL ISSUES AND THE ENVIRONMENT	9
Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation – Consumerism and waste products – Environment Production Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.	
UNIT –V HUMAN POPULATION AND THE ENVIRONMENT	**6**
Population growth, variation among nations – Population explosion – Family Welfare Programme – Environment and human health – Human Rights – Value Education - HIV / AIDS – Women and Child Welfare – Role of Information Technology in Environment and human health – Case studies.	

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS

5. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co, USA, 2000.
6. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science, UK, 2003
7. Trivedi R.Kand P.K.Goel, Introduction to Air pollution, Techno Science Publications, India, 2003.
8. Disaster mitigation, Preparedness, Recovery and Response, SBS Publishers & Distributors Pvt. Ltd, New Delhi, 2006.
9. Introduction to International disaster management, Butterworth Heinemann, 2006.
10. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, New Delhi, 2004.

REFERENCE BOOKS

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

E RESOURCES

1. Bharat Raj Singh, 2015, Global Warming: Causes, Impacts and Remedies, InTech.
2. Richard C. J. Somerville , The Forgiving Air: Understanding Environmental Change , 1998, University of California Press
3. Benny Joseph, Environmental Studies, 2005, Tata McGraw Hill.

XGS608			ACADEMIC WRITING SKILLS	L	T	P	SS	C
				0	0	0	2	0
C	P	A		L	T	P	SS	H
1.2	0.4	0.4		0	0	0	2	2

COURSE OUTCOMES:

CO1: C: R: ***Knowledge*** on the need for going beyond grammar in writing paragraphs and essays

CO2: C: U: ***Integrate*** all the written language elements into the production of a cohesive whole called a paragraph.

CO3: C: U: ***Practice*** the discourse features that connects sentences and paragraphs.

CO4: C: GR: ***Synthesize*** language and ideas to develop sentences, paragraphs and essays

CO5: P: A: ***Produce*** correct, proper, and fluent pieces of writing

SYLLABUS

Unit		Hours
I	**TYPES OF PARAGRAPHS** Definition of a paragraph, writing different types of paragraphs: definition paragraph, descriptive paragraph, process paragraph, comparison and contrast paragraph etc.	5
II	**DISCOURSE FEATURES:** Cohesion, coherence (connectives) etc; précis writing, summarizing	5
III	**VARIOUS TYPES OF ESSAYS** Discursive, argumentative, cause & effect, chronological etc;	5
IV	**USE OF LANGUAGE** Essays according to the type of essays	5
V	**Essay Writing practice**	10
	Writing practice (SS) : 30 hrs **Total : 30 hrs**	

TEXT BOOKS

1. D. H. Howe and G. MC Arthur, *Advance with English*, Oxford University Press,1993
2. Wren and Martine, *High School English Grammar and Composition*, S, Chand and Company, 1999.
3. Raymond Murphy, *Intermediate English Grammar*, Ii Ed., , Cambridge University Press, New Delhi,1994
4. Bikrim K. Das, *Functional Grammar and Spoken and written communication in English*, Orient Black swan, Hyderabad.Reprinted 2011,

Mapping of COs with GAs:

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

Total	1	1	0	4	0	0	0	0	1	8	2	6
Scaled	1	1	0	1	0	0	0	0	1	2	1	2

VII SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
XCS702	SOFTWARE ENGINEERING	3	0	1	4
C:P:A= 3:0.75:0.25					
		L	**T**	**P**	**H**
		3	0	2	5

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe, understand and compare*** various methods of software development activities and software development process models.	Cognitive Psychomotor	Describe, Understand, Apply
CO2	***Describe***, ***Ability to*** d***evelop, classify and analyze*** the knowledge of human-computer interaction and design software architecture for various application.	Cognitive Psychomotor Affect	Describe Create, Analyze
CO3	***Describe***, ***apply, Analyze***, **evaluate and test** the basics of software testing and metrics.	Cognitive Psychomotor Affect	Describe Create, Apply
CO4	***Describe***, ***apply, Analyze***, **evaluate and test** the basics of software maintenance and software project management concepts	Cognitive Psychomotor Affect	Describe Create, Evaluate,Apply
CO5	Understand and , ***Explain, develop*** and ***utilize*** the advanced software engineering concepts and software engineering development tools	Cognitive Psychomotor Affect	Describe Create, Apply

` UNIT-I SOFTWARE PROCESS AND REQUIREMENTS 9+ 3

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 - Data Modeling Concepts - Object Oriented Analysis.

List of Experiments:

10. Feasibility study for any two application
11. Project Planning for the above application
12. Software requirement analysis for any two application
13. Write SRS for any two application
14. Create traceability matrix for any two applications

UNIT –II DESIGN CONCEPTS AND PRINCIPLES 9 + 6

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 –Introduction-Designing Class-based Components- User interface analysis and design - Coupling and Cohesion- Design elements of interface, component level and deployment level.

List of Experiments:

15. Draw use-case, class for any two applications.
16. Draw sequence and collaboration diagram for any two applications.
17. Draw activity and state chart for any two applications.
18. Component, package and deployment diagram for any two applications.

UNIT-III	TESTING	9 + 6

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.

List of Experiments:

19. Generate and Implementation of skeleton code for any two application
20. Writing test cases for any two application
21. Testing process for any two application
22. Check verification & Validation for any two applications.

UNIT -IV	SOFTWARE PROJECT MANAGEMENT	9

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-Functional specification-Component-Based Development-Reengineering-Software Reengineering-Reverse Engineering- Forward Engineering- Introduction to CASE tools and testing tools – Software process improvement –Automation testing tools.

	LECTURE	PRACTICAL	TOTAL
	45	15	60

TEXT BOOKS

1. Roger S.Pressman, Software engineering- A practitioner's Approach, McGraw- Hill International Edition, 8th edition, 2015.

REFERENCES

1. Ian Sommerville, Software engineering, Pearson education Asia, 10th edition, 2016.
2. Pankaj Jalote- An Integrated Approach to Software Engineering, 3rd edition 2011.
3. C.Ravindranath Pandian, "Software metrics – A guide to planning, analysis and application", AUERBACH publication, Newyork 2011.
4. Ali Behforooz, Frederick J Hudson, "Software Engineering Fundamentals", second edition, Oxford University Press, Noida, 2009.

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1. NPTEL Course Prof. N. L. Sarda, IIT Bombay
2. http://vlab.co.in/
3. http://staruml.io/
4. http://argouml.tigris.org/
5. http://www.seleniumhq.org
6. IBM Rational Rose Enterprise Edition 8.1

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1	1	2	1	0	0	1	0	0	0	0	0	2	2	1
CO 2	2	3	3	2	2	1	3	0	0	0	0	1	3	2
CO 3	3	3	3	1	1	3	0	1	2	0	3	3	3	3
CO 4	3	3	3	1	1	3	0	1	2	0	3	3	3	3
CO 5	1	3	0	0	3	0	1	0	0	1	0	1	3	1
	10	14	10	4	7	8	4	2	4	1	6	10	14	10

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Original value	10	14	10	4	7	8	4	2	4	1	6	10	14	10
Scaled to 0,1,2,3 scale	2	3	2	1	2	2	1	1	1	1	2	2	3	2

COURSE CODE	COURSE NAME	L	T	P	C
XCS703	DATA ANALYTICS	3	1	1	5
C:P:A= 3:0.75:0.25					
		L	T	P	H
		3	2	2	7

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Understand and acquire*** the basic idea of big data, the key issues on big data, characteristics and statistical concepts	Cognitive	Describe, Understand
CO2	***Ability to solve, classify, analyze*** different ways of data analysis.	Cognitive Psychomotor Affect	Describe Create, Analyze
CO3	***Describe***, ***apply, analyze*** and **evaluate** the data analysis using HADOOP and RHADOOP	Cognitive Psychomotor Affect	Describe Create, Apply
CO4	***Explain, Analyze*** and ***Select*** visualization techniques and tools to analyze big data and create statistical models and understand how to handle large amounts of data.	Cognitive Psychomotor Affect	Describe Create, evaluate Apply
CO5	***Understand, and analyze*** the various frameworks and its applications	Cognitive Psychomotor Affect	Describe Create,Apply

UNIT-I **INTRODUCTION TO BIG DATA** **12+ 3**

Introduction to Big Data Platform – Challenges of Conventional Systems - Nature of Data Evolution of Analytic Scalability - Intelligent data analysis- Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error.

List of Experiments:

1. Calculate Summary Statistics using data analysis tool.
2. Study and implement prediction error.

UNIT –II **DATA ANALYSIS** **12 + 3**

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics – Rule induction – Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

List of Experiments:

3. Study and implementation of any two regression modeling.

UNIT-III **DATA ANALYSIS USING R AND HADOOP** **12 + 3**

Features of R language – HADOOP Features – HDFS and MapReduce architecture – R and Hadoop Integrated Programming Environment (RHIPE) Introduction – Architecture of RHIPE – RHIPE function reference – RHADOO Introduction – Architecture of RHADOOP – RHADOOP function reference, SQL on HADOOP.

List of Experiments:

4. Set up a pseudo-distributed, single-node Hadoop cluster backed by the Hadoop Distributed File System, running on Ubuntu Linux.

5. MapReduce application for word counting on Hadoop cluster.

UNIT -IV	PREDICTIVE ANALYTICS AND VISUALIZATION	12+3

Predictive Analytics – Supervised – Unsupervised learning – Neural networks – Kohonen models – Normal – Deviations from normal patterns – Normal behaviours – Expert options – Variable entry - Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications

List of Experiments:

6. K-means clustering using map reduce

UNIT - V	FRAMEWORKS AND APPLICATIONS 12+3

IBM for Big Data – Map Reduce Framework - Hadoop – Hive - – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Hbase – Impala – Analyzing big data with twitter – Big data for Ecommerce – Big data for blogs.

List of Experiments:

7. Unstructured data into NoSQL data and do all operations such as NoSQL query with API.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	15	15	75

TEXT BOOKS

1. Prajapati, Big Data Analytics with R and Hadoop, 2014
2. Stephan Kudyba, Big Data, Mining, and Analytics: Components of Strategic Decision Making, Auerbach Publications, March 12, 2014.
3. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
4. Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, ―Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill, 2011.

REFERENCES

5. Frank J Ohlhorst, ―Big Data Analytics: Turning Big Data into Big Money, Wiley and SAS Business Series, 2012.
6. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
7. Dr. Mark Gardener, Beginning R: The Statistical Programming Language (Wrox), 2013
8. Bill Franks, ―Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, Wiley and SAS Business Series, 2012.
9. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch , James Giles, David Corrigan, ―Harness the Power of Big data – The big data platform, McGraw Hill, 2012.
10. Tom White ― Hadoop: The Definitive Guide Third Edition, O‘reilly Media, 2012.
11. Pete Warden, Big Data Glossary, O‘Reilly, 2011.
12. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007

E REFERENCES

7. www.ibm.com/BigDataAnalytics
8. www.pentaho.com/product/big-data-analytics
9. http://www.sas.com/en_us/insights/analytics/big-data-analytics.html

10. https://www.edx.org/course/data-analytics-learning-utarlingtonx-link5-10x
11. www.ibm.com/IBMBigDataStreaming
12. http://www-01.ibm.com/software/data/infosphere/stream-computing
13. www.ibm.com/software/data/infosphere/stream-computing
14. bigdatauniversity.com/bdu-wp/bdu-course/stream-computing
15. www.ibm.com/software/data/infosphere/hadoop
16. http://blog.cloudera.com/blog/2013/06/whats-next-for-hbase-big-data-applications-usingframeworks-like-kiji/

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1	1	2	2	0	0	0	0	1	1	0	1	2	3	2
CO 2	0	3	0	2	2	1	3	1	1	0	0	0	3	1
CO 3	3	0	2	2	0	0	2	0	2	2	3	3	1	3
CO 4	1	0	3	0	1	3	0	1	2	0	3	3	3	3
CO 5	0	2	0	0	2	1	1	0	0	1	0	0	3	0
	6	7	7	4	5	5	6	3	6	3	7	8	13	9

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Original value	6	7	7	4	5	5	6	3	6	3	7	8	13	9
Scaled to 0,1,2,3 scale	2	2	2	1	1	1	2	1	2	1	2	3	5	2

COURSE CODE	COURSE NAME	L	T	P	C
XUMC706	CYBER SECURITY	3	0	0	3
C: P: A = 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	To ***identify***, ***learn, practice, and understand*** the basic concepts of networks and cyber-attacks.	Cognitive	Remember, Analyse, Apply.
CO2	To ***define*** the concepts of system vulnerability scanning and the scanning tools	Cognitive	Remember
CO3	To ***demonstrate, describe, and differentiate*** the network defense mechanisms and ***identify and apply*** the tools used to detect and quarantine network attacks.	Cognitive	Understand, Analyze, Apply.
CO4	To ***describe, differentiate, apply*** the different tools for scanning.	Cognitive	Understand, Analyze, Apply.
CO5	To ***identify*** and ***list*** the types of cybercrimes, cyber laws and cyber-crime investigations.	Cognitive	Remember

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 Treats 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

TEXT BOOKS

1. Nina Godbole, "Information Systems Security: Security Management, Metrics, Frameworks and Best Practices, w/cd", Wiley Publications, 2008, ISBN 10: 8126516925, ISBN 13 : 9788126516926
2. Thomas J. Mowbray, "Cybersecurity: Managing Systems, Conducting Testing and Investigating Intrusions", Wiley Publications, 2013, Kindle Edition, ISBN 10: 812654919X, ISBN 13 : 9788126549191
3. D.S. Yadav, "Foundations of Information Technology", New Age International publishers, 3rd Edition, 2006, ISBN-10: 8122417620, ISBN-13: 978-8122417623.

REFERENCES

1. Mike Shema, "Anti-Hacker Tool Kit", McGraw Hill Education, 4th edition, 2014,
2. Nina Godbole, Sunit Belapure, "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley publilcations, 2013, ISBN 10 : 8126521791, ISBN 13 : 9788126521791.
3. Corey Schou, Daniel Shoemaker, "Information Assurance for the Enterprise: A Roadmap to Information Security (McGraw-Hill Information Assurance & Security)",
   Tata McGraw Hill, 2013, ISBN-10: 0072255242, ISBN-13: 978-0072255249.
4. Vivek Sood, "Cyber Laws Simplified", McGraw Hill Education (INDIA) Private Limited in 2001, ISBN-10: 0070435065, ISBN-13: 978-0070435063.
5. Steven M.Furnell, "Computer Insecurity", Springer Publisher, 2005 Edition.

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1. https://www.cryptool.org/en/
2. https://www.metasploit.com/
3. http://sectools.org/tool/hydra/
4. http://www.hping.org/
5. http://www.winpcap.org/windump/install/
6. http://www.tcpdump.org/
7. https://www.wireshark.org/
8. https://ettercap.github.io/ettercap/
9. https://www.concise-courses.com/hacking-tools/top-ten/
10. https://www.cirt.net/Nikto2
11. http://sqlmap.org/

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2
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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
Original	11	13	13	13	8	2	7	7	6	0	0	0	9	6
Scaled to 0,1,2,3 scale	3	3	3	3	2	1	2	2	2	0	0	0	2	2

COURSE CODE	COURSE NAME	L	T	P	C
XCS707	PROJECT PHASE – I	0	0	2	2
C:P:A = 1:0.5:0.5					
		L	T	P	H
		0	0	2	4

COURSE OUTCOMES		DOMAIN	LEVEL
CO 1	I***dentify*** the Engineering Problem relevant to the domain interest.	Cog	Analyze
CO 2	***Interpret and Infer*** Literature survey for its worthiness.	Cog	Analyze, Apply
CO 3	***Analyse*** *and* ***identify*** an appropriate technique for solve the problem.	Cog	Analyze, Apply
CO 4	***Perform*** experimentation /Simulation/Programming/Fabrication, ***Collect*** *and* ***interpret*** data.	Psy, Cog	Create, Apply
CO 5	**Record and Report the** technical findings as a document.	Cog	Remember, Understand
CO 6	***Devote*** oneself as a responsible member and ***display*** as a leader in a team to ***manage*** projects.	Aff, Cog	Value, Organization, Create
CO 7	***Responding*** of project findings among the technocrats.	Aff	Responding

CO Vs GA Mapping

	CO1	CO2	CO3	CO4	CO5	CO6	CO7	Total	Scaled
GA1	3	2	1	2	1	-	1	10	2
GA2	3	2	1	2	1	-	1	10	2
GA3	-	-	1	3	1	-	-	5	1
GA4	-	1	2	3	1	2	2	11	3
GA5	-	-	2	3	1	-	-	6	2
GA6	1	-	1	1	-	3	3	10	2
GA7	1		1	1	-	1		4	1
GA8	1	-	1	1	-	3	-	6	2
GA9	-	-	-	-	2	3	1	6	2
GA10	-	-	-	-	3	3	3	9	2
GA11	-				2	2	2	6	2

XCS709 INPLANT TRAINING – III

C:P:A = 2:2:2/ 1:1:1

CO1: Cog(U) *Relate* classroom theory with workplace practice

CO2: Affective(Respond) *Comply with* Factory discipline, management and business practices.

CO3: Affective (Value) *demonstrates* teamwork and time management.

CO4: Psychomotor(Perception , Set) *Describe* and *Display* hands-on experience on practical skills obtained during the programme.

CO5: Cog(E) *Summarize* the tasks and activities done by technical documents and oral presentations.

Table 1: Mapping COs with B.Tech GAs

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

VIII SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
XCS804	PROJECT PHASE – II	0	0	12	12
C:P:A 6:3:3					
		L	T	P	H
		0	0	24	24

COURSE OUTCOMES		DOMAIN	LEVEL
CO 1	**I*dentify*** the Engineering Problem relevant to the domain interest.	Cog	Analyze
CO 2	***Interpret and Infer*** Literature survey for its worthiness.	Cog	Analyze, Apply
CO 3	***Analyse*** *and* ***identify*** an appropriate technique for solve the problem.	Cog	Analyze, Apply
CO 4	***Perform*** experimentation /Simulation/Programming/Fabrication, ***CollFFect*** *and* ***interpret*** data.	Psy, Cog	Create, Apply
CO 5	**Record and Report the** technical findings as a document.	Cog	Remember, Understand
CO 6	***Devote*** oneself as a responsible member and ***display*** as a leader in a team to ***manage*** projects.	Aff, Cog	Value, Organization, Create
CO 7	***Responding*** of project findings among the technocrats.	Aff	Responding

CO Vs GA Mapping

	CO1	CO2	CO3	CO4	CO5	CO6	CO7	Total	Scaled
GA1	3	2	1	2	1	-	1	10	2
GA2	3	2	1	2	1	-	1	10	2
GA3	-	-	1	3	1	-	-	5	1
GA4	-	1	2	3	1	2	2	11	3
GA5	-	-	2	3	1	-	-	6	2
GA6	1	-	1	1	-	3	3	10	2
GA7	1		1	1	-	1		4	1
GA8	1	-	1	1	-	3	-	6	2
GA9	-	-	-	-	2	3	1	6	2
GA10	-	-	-	-	3	3	3	9	2
GA11	-				2	2	2	6	2
GA12	1				3	3	1	8	2

OPEN ELECTIVES

COURSE CODE	COURSE NAME	L	T	P	C
XCSOE1	FREE OPEN SOURCE SOFTWARE	3	0	0	3
C:P:A= 2.5:0.3:0.2		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Understand*** the Linux Basic Commands.	Cognitive	Remember
CO2	***Describe*** the Shell Programming.	Cognitive	Remember Understand
CO3	***Understand*** the networks in Linux.	Cognitive	Remember
CO4	***Understand*** the concept of Services on Internet	Cognitive	Remember
CO5	***Understand*** the concept of Programming in Linux.	Cognitive	Remember

UNIT I - LINUX BASIC COMMANDS **9**

Introduction to Linux Operating System - Basic UNIX Commands - File Filters: File Related Commands - Piping -Joining, awk and backup Commands - Processes in Linux: User Process and Terminal Handling.

Unit II SHELL PROGRAMMING **9**

Configuring Linux Services

Debian Linux Installation - Redhat Fedora Core Installation - Installing Apache: The Web Server - Samba Installation and Configuration: File Sharing – Compiling from Sources – Installing - NFS - Installing SMTP Mail Server - Installing Common Unix printing System.

Unit III NETWORKS IN LINUX **9**

Installing Squid Proxy and Firewalls - Users and Account Management: Configuration - Creating - Testing -Removing - Allocating - System Logging: Logging - Accounting - Graphical Tools – Networks.

Unit IV SERVICES ON INTERNET **9**

Compiling and Debugging

Compiling C and C++ Programs under Linux - GNU Debugger: Debugger using GDB - Make: Syntax of makefiles - Automake and Autoconf - Python: Invoking Python.

Unit V PROGRAMMING IN LINUX **9**

Programming in Linux

Introduction to Perl - Ruby: OOPS through Ruby - Profiling - Calling UNIX System Calls from Ruby - X Windows Architecture and GUI Programming: GTK Programming - Qt Programming. *Glade: Visual Designer Tool for GTK and GNOME*

LECTURE	TUTORIAL	TOTAL
45	-	45

TEXT BOOKS

1. N. B. Venkateshwarlu, *Introduction to Linux: Installation and Programming*, B S Publishers; 2011. (AnNRCFOSS Publication)

REFERENCES

1. Matt Welsh, Matthias Kalle Dalheimer, Terry Dawson, and Lar Kaufman, *Running Linux*, O'Reilly Publishers, December 2002, ISBN: 0-596-00272-6
2. Carla Schroder, *Linux Cookbook*, O'Reilly Cookbooks Series, November 2004, ISBN: 0 596-00650-3.
3. B.Mahendran, Understanding FOSS, GNU Developers, 2009

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1. Open Sources: Voices from the Open Source Revolution, January 1999, ISBN: 1-56592 582-3.
2. URL: http://www.oreilly.com/catalog/opensources/book/toc.html.
3. The Linux Cookbook: Tips and Techniques for Everyday Use, Michael Stutz, 2001. URL:http://dsl.org/cookbook/cookbook_toc.html.\
4. The Linux System Administrators' Guide, Lars Wirzenius, Joanna Oja, Stephen Stafford, and Alex Weeks, December 2003. URL: http://www.tldp.org/guides.html.
5. Using GCC, Richard Stallman et al. URL: http://www.gnu.org/doc/using.html.
6. An Introduction to GCC, Brian Gough. URL: http://www.network-theory.co.uk/docs/gccintro

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
CO 1	1	3	3	1	3	0	0	0	2	2	2	2	2	1
CO 2	2	3	3	2	3	0	0	0	3	3	1	1	3	2
CO 3	2	3	3	2	3	0	0	0	3	3	1	1	3	2
CO 4	3	2	2	1	2	0	0	0	3	3	0	1	3	2
CO 5	3	2	2	1	2	0	0	0	3	3	0	1	3	2
Tota l	11	13	13	7	13	0	0	0	14	14	4	6	14	9

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS O 1	PS O 2
Origin al value	11	13	13	7	13	0	0	0	14	14	4	6	14	9
Scaled to 0,1,2,3 scale	3	3	3	2	3	0	0	0	3	3	1	2	3	2

COURSE CODE	COURSE NAME	L	T	P	C
XCSOE2	WEB DESIGN	3	0	0	3
C: P: A = 2.2:0.3:0.2					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** and ***Explain*** *the l*earning principles and techniques of client-side programming with HTML.	Cognitive, Psychomotor, Affective	Create, Apply, Practicing, Receiving
CO2	To ***demonstrate*** and ***develop and*** familiarize with Scripting languages.	Cognitive, Psychomotor	Remember, Create, Apply, Practicing
CO3	To ***demonstrate*** and ***Use*** the web site dynamic behavior and server side programming.	Cognitive	Understand
CO4	To ***Understand*** the basic concepts of the CMS.	Cognitive	Understand
CO5	To ***demonstrate*** and ***use*** the Joomla Tool.	Cognitive, Psychomotor	Understand, Create, Apply, Practicing

UNIT I – HTML5 **9**

Introducing HTML5 – Hello HTML5 – Loose Syntax Returns – XHTML5 – Embraciing the Reeaity of Web Markup – Presentational Markup Removed and Redefined - Document Structure Changes – Adding Semantics – Open Media Effort – Client Side Graphics with <Canvas> - Form Changes – Emerging Elements and Attributes to support web Applications – Internationalization Improvements – HTML5 Meta Changes – Beyond Markup – Major HTML5 Themes -

UNIT II – CSS **9**

Frames: A glance at a common but deprecated element; advantages and disadvantages; frame and frameset properties. Images: Image types (JPG, GIF, PNG). Image file sizes. Making or finding images. Photoshop for image cropping and sizing. Bringing Styles to Web Pages: Inline, embedded, and external styles. Writing Style Rules: Writing CSS selectors and rules to tie style attributes and values to html elements. The cascade: Inheritance, specificity, and the cascade.

UNIT III – ADVANCED CSS **9**

Styling text: Font and text properties. Media: Separate style sheets for screen and print. Print Media: Controlling Page Breaks. The Box Model: Styling with content, padding, borders, and margins. Using margins to separate and position.

Color: Color and background color. Color coding in hex, percentages, names. CSS positioning: Static, relative, and absolute positioning. Floating: Floated elements and their margins.Styling Links and Lists: Pseudostates and lists within lists. Generating text: "Greeked text" for text-filling—Lorem Ipsum and Cupcake Ipsum.

UNIT IV – INTRODUCTION TO CONTENT MANAGEMENT SYSTEMS **9**

Exploring CMS terminology, Open Source revolution, PHP,MySQL,server-side, client-side, static and dynamic HTML website, CMS web pages generation, Website strategy and planning, site mapping content planning.

UNIT V – BUILDING WEBSITES USING JOOMLA			9
Install Joomla on a server, Create a site structure, Create menu systems, Layout pages and add content of all types to pages, Link to articles and create special menu items, Use of Joomla Plug-ins, Modules, Components and other extensions, Creation and uses of customized Joomla templates, Modifying templates using CSS and HTML, Adding an exclusive area of a site for visitors.			
	LECTURE	**TUTORIAL**	**TOTAL**
	45	**0**	**45**

TEXTBOOKS

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.
5. Jennifer Marriott, Elin Waring, "The Official Joomla! Book – 2nd Edition", Addison-Wesley Professional, 2012.

REFERENCES

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.
3. Stephen Burge,"Joomla!® 3 Explained: Your Step-by-Step Guide", Joomla! Press, 2nd Edition, July 2014.

E – REFERENCES

1. https://docs.oracle.com/cd/E19957-01/816-6408-10/contents.htm
2. http://docs.oracle.com/javase/7/docs/technotes/guides/scripting/programmer_guide/
3. http://www.w3schools.com/js/default.asp
4. https://www.joomla.org/

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2
CO1	3	3	3	3	3	2	2	2	1	0	0	2	3	3
CO2	3	3	3	3	3	2	2	2	1	0	0	2	3	3
CO3	2	2	2	3	3	3	2	2	1	0	0	1	2	2
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	13	12	13	14	12	7	8	8	5	0	0	5	11	10

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
Original	13	12	13	14	12	7	8	8	5	0	0	5	11	10
Scaled to 0,1,2,3 scale	3	3	3	3	3	2	2	2	1	0	0	1	3	2

COURSE CODE	COURSE NAME	L	T	P	C
XCSOE3	**OBJECT ORIENTED PROGRAMMING**	**3**	**0**	**0**	**3**
C: P: A = 2.875: 0.875:0.25					
		L	T	P	H
		3	**0**	**0**	**3**

COURSE OUTCOMES		**DOMAIN**	**LEVEL**
CO1	***Describe*** classes and objects and ***Explain*** *and* ***Develop*** different types of classes and objects in detail	Cognitive, Psychomotor, Affective	Create, Apply, Practicing, Receiving
CO2	To ***demonstrate*** adeptness of object oriented programming in ***developing*** solution to problems demonstrating *usage* of data abstraction, encapsulation and inheritance	Cognitive, Psychomotor	Remember, Create, Apply, Practicing
CO3	To **use** and ***Describe*** the syntax and features of exception handling	Cognitive	Understand
CO4	To ***demonstrate*** and ***Use*** the ability to implement one or more patterns involving dynamic binding and utilization of polymorphism in the solution of problems	Cognitive	Understand
CO5	To ***demonstrate*** the ability to ***develop*** solution to various I/O manipulation operations.	Cognitive, Psychomotor	Remember, Create, Apply, Practicing

UNIT -1 INTRODUCTION	**9**
Object oriented programming concepts – objects – classes – methods and messages – Abstraction and encapsulation – inheritance – abstract classes – polymorphism. Introduction to C++ – classes – access specifiers – function and data members – default arguments – function overloading – friend functions – const. and volatile functions - static members – Objects – pointers and objects – constant objects – nested classes – local classes.	
UNIT- II PROGRAMMING IN C++	**9**
Constructors – default constructor – Parameterized constructors – Constructor with dynamic allocation – copy constructor – destructor – operator overloading – overloading through friend functions – overloading the assignment operator – type conversion – explicit constructor.	
UNIT- III FUNCTION IN C++	**9**
Function and class templates - Exception handling – try-catch-throw paradigm – exception specification – terminate and Unexpected functions – Uncaught exception.	
UNIT – IV INHERITANCE and POLYMORPHISM	**9**
Inheritance – public, private, and protected derivations – multiple inheritance - virtual base class – abstract class – composite objects - Polymorphism - Runtime polymorphism – virtual functions – pure virtual functions – RTTI – typeid – dynamic casting – RTTI and templates – cross casting – down casting.	
UNIT – V File Handling	**9**
Streams and formatted I/O - I/O manipulators - file handling - random access - object serialization - namespaces - std namespace - ANSI String Objects - standard template library.	

LECTURE	**PRACTICAL**	**TOTAL**
45	**-**	**45**

TEXT BOOKS

1. B. Trivedi, "Programming with ANSI C++", Oxford University Press, 2013, ISBN: 0198083963, 9780198083962.
2. Paul Deitel, Harvey Deitel, "C++ How to Program", Sixth Edition, Prentice Hall, 2011, ISBN-13: 978-0132662369, ISBN-10: 0132662361.

REFERENCES

1. Balagurusamy E., "Object oriented programming with C++", Fifth Edition, Third Reprint, Tata McGraw–Hill Education 2011.
2. Ira Pohl, "Object Oriented Programming using C++", Pearson Education, Second Edition, Reprint 2007.
3. B. Stroustrup, "The C++ Programming language", Third edition, Addison-Wesley Professional, 4th edition 2013, ISBN-10: 0321563840, ISBN-13: 978-0321563842.

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1. http://spoken-tutorial.org/tutorial- search/?search_foss=C+and+Cpp&search_language=
2. http://www.nptel.ac.in
3. http://www.learncpp.com/
4. http://vlab.co.in

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2
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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Original	11	13	13	13	8	2	7	7	6	0	0	0	9	6
Scaled to 0,1,2,3 scale	3	3	3	3	2	1	2	2	2	0	0	0	2	2

COURSE CODE	COURSE NAME	L	T	P	C
XCSOE4	MULTIMEDIA DESIGN AND DEVELOPMENT	3	0	0	3
C:P:A = 3:0:0		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the multimedia application.	Cognitive	Remember
CO2	***Describe, Explain*** the digital presentation.	Cognitive	Remember ,Understand
CO3	***Describe*** the text and image.	Cognitive	Remember
CO4	***Describe*** and ***Explain*** audio and video technology	Cognitive	Remember , Understand
CO5	***Explain*** compression and multimedia authoring.	Cognitive	Understand

UNIT I	INTRODUCTION	9

What is multimedia? Defining the scope of multimedia. Applications of multimedia, hardware and software requirements, multimedia database.

UNIT II	DIGITAL REPRESENTATION	9

Introduction, Analog representation, waves, digital representation, need for digital representation, A to D conversion, D to A conversion, relation between sampling rate and bit depth, Quantization error, Fourier representation, pulse modulation. Importance and drawback of digital representation.

UNIT III	TEXT AND IMAGE	9

Introduction, Types of text, Font, insertion, compression,File formats. Types of images, colour models, Basic steps for image processing, principle and working of scanner and digital camera, Gamma and gamma correction.

UNIT IV	AUDIO AND VIDEO TECHNOLOGY	9

Fundamental characteristics of sound, psycho- 20 acoustics, Raster scanning principles, sensors for TV cameras, color fundamentals, additive and COURSEtractive color mixing, Liquid crystal display (LCD), Plasma Display Panel (PDP), file formats

UNIT V	COMPRESSION AND MULTIMEDIA AUTHORING	9

What is compression? Need for compression, Types of compression- basic compression techniques-run length, Huffman's coding, JPEG, zip coding. Overview of Image and Video compression techniques. Overview, multimedia authoring metaphor, multimedia production, presentation and automatic authoring, Design paradigms and user interface, overview of tools like adobe premier, director, flash and dreamweaver.

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS

1. Principles of Multimedia by Ranjan Parekh. Tata McGraw-Hill Reference: 2nd Edition 2012.
2. Multimedia Systems Design by Prabhat K. Andleigh and Kiran Thakrar-PHI publication ,1996

3. Multimedia systems by John F. Koegal Buford-Pearson Education. 2009
4. Fundamentals of multimedia by Ze-Nian Li and MS Drew. PHI EEE edition.2008.

E-REFERENCES

1.http://www.humber.ca/program/multimedia-design-and-development

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O 1**	**PS O 2**
CO 1	1	3	3	1	3				2	2	2	2	2	1
CO 2	2	3	3	2	3				3	3	1	1	3	2
CO 3	2	3	3	2	3				3	3	1	1	3	2
CO 4	3	2	2	1	2				3	3		1	3	2
CO 5	3	2	2	1	2				3	3		1	3	2
	11	13	13	7	13				14	14	4	6	14	9

	PO1	**PO2**	**PO3**	**PO4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PS O 1**	**PS O 2**
Original value	**11**	**13**	**13**	**7**	**13**				**14**	**14**	**4**	**6**	**14**	**9**
Scaled to 0,1,2,3 scale	**3**	**3**	**3**	**2**	**3**	**0**	**0**	**0**	**3**	**3**	**1**	**2**	**3**	**2**

COURSE CODE	COURSE NAME	L	T	P	C
XCSOE5	DIGITAL MARKETING	3	0	0	3
C:P:A = 3:0:0		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the evolution of marketing.	Cognitive	Remember
CO2	***Explain*** the digital world	Remember	Remember, Understand
CO3	***Describe*** the web intelligence and E-mail marketing.	Cognitive	Remember
CO4	***Describe*** the social media and online consumer management.	Cognitive	Remember, Understand
CO5	***Explain*** affiliate marketing	Cognitive	Understand

UNIT I	INTRODUCTION	9

The evolution of marketing: The changing face of advertising -The technology behind digital marketing -Enough technology – let's talk about people- **Strategic thinking-** Why you need a digital marketing strategy -Your business and digital marketing -Defining your digital marketing strategy -Understanding the digital consumer

UNIT II	WINDOW TO THE DIGITAL WORLD	9

Your website – the hub of your digital marketing world -Building an effective website The main steps of building your website -Before you start -Choosing your domain name How to choose a web designer or developer-Arranging your information -Writing effective web content

UNIT III	WEBSITE INTELLIGENCE AND RETURN ON INVESTMENT	9

Measuring your way to digital marketing success -Getting started -How information is measured Measuring what's important to you -Testing, investing, tweaking, reinvesting -Action stations Harness the power of online data, and watch your ROI-take off **E-mail marketing-** The new direct mail -What exactly is e-mail marketing? -Before you start -Planning your campaign -Dos and don'ts of an e-mail marketing campaign -Measuring your success -Still a vital component of digital marketing

UNIT IV	SOCIAL MEDIA AND ONLINE CONSUMER ENGAGEMENT	9

Join the conversation -What is social media? -The different forms of social media -The rules of engagement -Adding social media to your own site Fostering a positive online image -romoting your business through online channels -Monitoring the conversation – reputation management Damage limitation: turning the tide when things go wrong

UNIT V	AFFILIATE MARKETING AND DIGITAL MEDIA CREATIVE	9

Recognizing opportunities for strategic partnership -What is affiliate marketing? -The click that really counts -What advertisers should do Creative application of digital media -Using an Agency -Doing it yourself -Digital creative: what works and what doesn't

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS

1. Understanding Digital Marketing -Marketing strategies for engaging the digital generation - Damian Ryan and Calvin Jones, 2009

REFERENCES

1. Digital Foundations: Intro to Media Design with the Adobe Creative Suite 1st Edition-xtine burrough ,Michael Mandiberg.2009.
2. Web Intelligence- Zhong, Ning, Liu, Jiming, Yao, Yiyu-2003

E-REFERENCE

1. http://www.slideshare.net/narendrasharma/digital-marketing-ppt
2. http://www.slideshare.net/priyanka2512dolly/digital-marketing-basics-and-trends
3. https://www.google.co.in/?gfe_rd=cr&ei=fPIWV9uGFOXQ-AOI-YCgBQ&gws_rd=ssl#q=digital+marketing.ppt
4. https://www.youtube.com/watch?v=IaiVtB5X8B8

Mapping of COs with POs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO 1	1	3	3	1	3				2	2	2	2	2	1
CO 2	2	3	3	2	3				3	3	1	1	3	2
CO 3	2	3	3	2	3				3	3	1	1	3	2
CO 4	3	2	2	1	2				3	3		1	3	2
CO 5	3	2	2	1	2				3	3		1	3	2
	11	13	13	7	13				14	14	4	6	14	9

Subject Versus POs

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O 1**	**PS O 2**
Original value	11	13	13	7	13				14	14	4	6	14	9
Scaled to 0,1,2,3 scale	3	3	3	2	3	0	0	0	3	3	1	2	3	2

PROFESSIONAL ELECTIVES

V SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
XCSE51	CRYPTOGRAPHY AND NETWORK SECURITY	2	1	0	3
C:P:A = 3:0:0		L	T	P	H
		2	2	0	4

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe and understand*** the concept of various security attacks.	Cognitive	Remember
CO2	***Explain and understand*** the Concept Various encryption Techniques.	Cognitive	Remember Understand
CO3	***Explain*** and solve problems related to key Exchange Techniques.	Cognitive	Remember
CO4	***Describe*** Authentication Techniques.	Cognitive	Remember , Understand
CO5	***Describe and understand*** the concept of various security mechanisms.	Cognitive	Comprehension

UNIT I – BASICS OF CRYPTOGRAPHY **9**

Security trends – Attacks and services – Classical crypto systems – Different types of ciphers –LFSR sequences – Basic Number theory – Congruences – Chinese Remaindertheorem Modular exponentiation – Fermat and Euler's theorem – Legendre and Jacobi symbols – Finite fields – continued fractions.

UNIT II ENCRYPTION STANDARDS **9**

Simple DES – Differential cryptoanalysis – DES – Modes of operation – Triple DES – AES – RC4 – RSA– Attacks – Primality test – factoring.

UNIT III KEY EXCHANGE ALGORITHMS **9**

Discrete Logarithms – Computing discrete logs – Diffie-Hellman key exchange – ElGamal Public keycryptosystems – Hash functions – Secure Hash – Birthday attacks - MD5 – Digital signatures – RSA –ElGamal – DSA.

UNIT IV APPLICATION PROTOCOLS **9**

Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP, S/MIME –IPsecurity – Web Security – SSL, TLS, SET.

UNIT V SECURITY ISSUES 9

System security – Intruders – Malicious software – viruses – Firewalls – Security Standards.

LECTURE	TUTORIAL	TOTAL
30	15	45

TEXT BOOKS

1. Wade Trappe, Lawrence C Washington, "Introduction to Cryptography with coding the ory", 2nd ed,Pearson, 2007.
2. William Stallings, "Crpyptography and Network security Principles and Practices", Pear son/P HI, 4thed, 2006.

REFERENCES

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 ofIndia, 2006

Mapping of COs with POs

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1	2	2	0	0	0	0	0	1	0	0	0	1	1	2
CO 2	0	3	2	0	0	0	0	0	0	0	0	1	1	2
CO 3	3	2	2	0	0	0	0	0	0	0	0	1	1	2
CO 4	1	3	0	0	0	0	0	0	0	0	0	1	1	2
CO 5	0	0	3	2	0	1	0	2	0	0	0	1	1	2
Total	6	10	7	2	0	1	0	3	0	0	0	5	5	10

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O 1**	**PS O 2**
Original	6	10	7	2	0	1	0	3	0	0	0	5	5	10
Scaled to 0,1,2,3 scale	2	2	2	1	0	1	0	1	0	0	0	1	1	2

COURSE CODE	COURSE NAME	L	T	P	C
XCSE52	DISTRIBUTED COMPUTING	2	1	0	3
C:P:A = 3:0:0		L	T	P	H
		2	2	0	4

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Use*** network ***Define*** and ***Explain*** fundamental of network type, Internet protocol.	Cognitive	Knowledge Apply
CO2	***Define*** and ***Explain*** the idea of middleware and related issues.	Cognitive	Knowledge Apply
CO3	***Understand*** in detail the system level and support required for distributed system.	Cognitive	Knowledge, Apply
CO4	***State*** and ***Explain*** various algebraic structure and corresponding theorems To understand the issues involved in studying data and design of distributed algorithms.	Cognitive	Knowledge, Create
CO5	To ***understand*** the Distributed Transaction Processing.	Cognitive	Knowledge, Create

UNIT I INTRODUCTION **9**

Characterization of Distributed Systems – Examples – Resource Sharing and the Web – Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles – Internet Protocols – Case Studies.

UNIT II PROCESSES AND DISTRIBUTED OBJECTS **9**

Inter–process Communication – The API for the Internet Protocols – External Data Representation and Marshalling – Client –Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication Between Distributed Objects – Remote Procedure Call – Events and Notifications – Java RMI – Case Study.

UNIT III OPERATING SYSTEM ISSUES I **9**

The OS Layer – Protection – Processes and Threads – Communication and Invocation – OS Architecture – Security – Overview – Cryptographic Algorithms – Digital Signatures – Cryptography Pragmatics – Case Studies – Distributed File Systems – File Service Architecture – Sun Network File System – The Andrew File System.

UNIT IV OPERATING SYSTEM ISSUES II **9**

Name Services – Domain Name System – Directory and Discovery Services – Global Name Service – X.500 Directory Service – Clocks – Events and Process States – Synchronizing Physical Clocks – Logical Time And Logical Clocks – Global States – Distributed Debugging – Distributed Mutual Exclusion – Elections – Multicast Communication Related Problems.

UNIT V DISTRIBUTED TRANSACTION PROCESSING	9
Transactions – Nested Transactions – Locks – Optimistic Concurrency Control – Timestamp Ordering – Comparison – Flat and Nested Distributed Transactions – Atomic Commit Protocols – Concurrency Control in Distributed Transactions – Distributed Deadlocks – Transaction Recovery – Overview of Replication And Distributed Multimedia Systems.	

	LECTURE	TUTORIAL	TOTAL
	30	15	45

TEXT BOOKS

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems Concepts and Design" Fifth edition – 2011- Addison Wesley.

REFERENCES

1. Tanenbaum A.S., Van Steen M., "Distributed Systems: Principles and Paradigms", Pearson Education, 2007.
2. Liu M.L., "Distributed Computing, Principles and Applications", Pearson and education, 2004.

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
CO 1	1	1	1	0	0	1	0	0	0	1	0	1	2	3
CO 2	1	2	1	0	0	1	0	0	0	1	0	1	1	2
CO 3	2	2	0	0	0	0	0	0	0	0	0	1	1	2
CO 4	0	2	0	0	0	0	0	0	0	0	0	1	2	2
CO 5	1	2	0	0	0	0	0	0	0	0	0	1	2	2
	5	9	2	0	0	2	0	0	0	2	0	4	6	9

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	5	9	2	0	0	2	0	0	0	2	0	4	6	9
Scaled to 0,1,2,3 scale	1	2	1	0	0	1	0	0	0	1	0	1	2	2

COURSE CODE	COURSE NAME	L	T	P	C
XCSE53	GRAPH THEORY	2	1	0	3
C: P: A = 3:0:0					
		L	T	P	H
		2	2	0	4

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Define*** and ***Explain the*** circuits and trees.	Cognitive	Remembering Understanding
CO2	***Describe*** **the** circuits and isomorphism	Cognitive	knowledge
CO3	***Identify*** and ***Explain*** the matrix	Cognitive	Understanding Apply
CO4	***State*** and ***Explain*** the spanning tree	Cognitive	Remembering Understanding
CO5	***Understand*** the concepts of algorithm.	Cognitive	Apply

UNIT I INTRODUCTION **9**

Graphs – Introduction – Isomorphism –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.

UNIT II CIRCUITS AND ISOMORPHISM **9**

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.

UNIT III MATRIX **9**

Incidence matrix –matrices – Circuit Matrix – Path Matrix – Adjacency Matrix – 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 – Adjacency Matrix of a Digraph

UNIT IV SPANNING TREE **9**

Algorithms: Connectedness and Components – Spanning tree – Finding all Spanning Trees of a Graph –Set of Fundamental Circuits – Cut Vertices and Separability – Directed Circuits.

UNIT V DFS ALGORITHM **9**

Algorithms: Shortest Path Algorithm – DFS –Planarity Testing – Isomorphism

	LECTURE	TUTORIAL	TOTAL
	30	15	45

TEXT BOOKS

1.Narsingh Deo, “Graph Theory: With Application to Engineering and Computer Science”, PHI, 2003

REFERENCES

1. R.J. Wilson, “Introduction to Graph Theory”, Fifth Edition, Pearson Education, 2012.

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	2	3	2	2	1	1	0	0	0	2	2	3	1
CO 2	3	2	3	1	2	1	2	0	0	0	1	1	3	1
CO 3	3	2	2	2	2	1	1	0	0	0	3	1	3	1
CO 4	3	2	2	1	2	1	1	0	0	0	1	1	3	1
CO 5	3	2	3	2	1	1	1	0	0	0	2	1	3	1
Total	15	10	13	8	9	5	6	0	0	0	9	6	15	5

	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	PO 10	PO 11	PO 12	PS O1	PS O 2
Original value	15	10	13	8	9	5	6	0	0	0	9	6	15	5
Scaled to 0,1,2,3 scale	3	3	3	2	2	1	2	0	0	0	2	2	3	1

COURSE CODE	COURSE NAME	L	T	P	C
XCSE54	COMPUTER GRAPHICS AND MULTIMEDIA	2	1	0	3
C:P:A = 3:0:0					
		L	T	P	H
		2	2	0	4

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	**Describe** the output primitives.	Cognitive	Remember
CO2	***Explain*** the 3D transformation	Cognitive	Remember
CO3	***Understand*** the Multimedia File Handling.	Cognitive	Remember
CO4	**Explain** the multimedia system.	Cognitive	Remember , Understand
CO5	***Describe*** and ***Apply*** the knowledge of hypermedia.	Cognitive	Understand , Remember ,

UNIT I OUTPUT PRIMITIVE **9**

Introduction - Line - Curve and Ellipse Algorithms – Attributes – Two-Dimensional Geometric Transformations – Two-Dimensional Viewing.

UNIT II THREE-DIMENSIONAL CONCEPTS **9**

Three-Dimensional Object Representations – Three-Dimensional Geometric and Modeling Transformations – Three-Dimensional Viewing – Color models – Animation

UNIT III MULTIMEDIA SYSTEMS DESIGN **9**

An Introduction – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Data interface standards – Multimedia Databases.

UNIT IV MULTIMEDIA FILE HANDLING **9**

Compression & Decompression – Data & File Format standards – Multimedia I/O technologies - Digital voice and audio – video image and animation – Full motion video – Storage and retrieval Technologies.

UNIT V HYPERMEDIA **9**

Multimedia Authoring & User Interface – Hypermedia messaging - Mobile Messaging – Hypermedia message component – creating Hypermedia message – Integrated multimedia message standards – Integrated Document management – Distributed Multimedia Systems.

	LECTURE	TUTORIAL	TOTAL
	30	15	45

TEXT BOOKS

1. Donald Hearn and M.Pauline Baker, “Computer Graphics C Version”, Pearson Education, fourth edition, 2010.
   (UNIT I : Chapters 1 to 6; UNIT 2: Chapter 9 – 12, 15, 16)
2. Prabat K Andleigh and Kiran Thakrar, “Multimedia Systems and Design”, PHI, 2003. (UNIT 3 to 5)

REFERENCES
1. Judith Jeffcoate, "Multimedia in practice technology and Applications", PHI,1998. 2. Foley, Vandam, Feiner, Huges, "Computer Graphics: Principles & Practice", Pearson Education, second edition 2003.
E-REFERENCES
1. http://nptel.iitm.ac.in/video.php?CourseId=106106090 (Computer Graphics)
2. http://iiith.vlab.co.in/?COURSE=21&brch=205

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O2
CO 1	3	1	2	1	2	0	0	0	0	1	0	0	1	0
CO 2	2	2	2	1	2	0	0	0	0	1	0	0	2	0
CO 3	2	2	2	2	2	0	1	0	0	1	0	0	2	2
C04	2	1	2	1	1	0	0	0	0	2	0	0	2	1
Co5	7	5	6	4	6	0	1	0	0	3	0	0	5	2

Courses	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
Original	7	5	6	4	6	0	1	0	0	3	0	0	5	2
Scaled to 0,1,2,3 scale	2	1	2	1	2	0	1	0	0	1	0	0	1	1

VI SEMESTER ELECTIVES

COURSE CODE	COURSE NAME	L	T	P	C
XCSE61	ADVANCED DATABASES	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Explain*** the concepts of parallel and distributed databases	Cognitive	Understand
CO2	***Explain*** the concepts and applications of Object Oriented database	Cognitive	Understand
CO3	***Understand*** and ***Describe*** the principles of intelligent databases.	Cognitive	Remember, Understand
CO4	***Identify*** and be able to use recent and advanced database techniques.	Cognitive	Apply

UNIT I PARALLEL AND DISTRIBUTED DATABASES **9**

Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism – Design of Parallel Systems Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing

UNIT II OBJECT AND OBJECT RELATIONAL DATABASES **9**

Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems: Object Relational features in SQL/Oracle

UNIT III INTELLIGENT DATABASES **9**

Active Databases: Syntax and Semantics (Starburst, Oracle, DB2)- Taxonomy- Applications Design Principles for Active Rules- Temporal Databases: Overview of Temporal DatabasesTSQL2- Deductive Databases: Logic of Query Languages – Data log- Recursive Rules-Syntax and Semantics of Datalog Languages- Implementation of Rules and Recursion- Recursive Queries in SQL- Spatial Databases- Spatial Data Types- Spatial Relationships- Spatial Data Structures Spatial Access Methods- Spatial DB Implementation

UNIT IV ADVANCED DATA MODELS **9**

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols- Multimedia Databases- Information Retrieval- Data Warehousing Data Mining- Text Mining.

UNIT V EMERGING TECHNOLOGIES **9**

XML Databases: XML-Related Technologies-XML Schema- XML Query Languages-Storing XML in Databases-XML and SQL- Native XML Databases- Web Databases-Geographic Information Systems- Biological Data Management- Cloud Based Databases: Data Storage Systems on the Cloud- Cloud Storage Architectures-Cloud Data Models-Query Languages- Introduction to Big Data-Storage-Analysis.

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

REFERENCES

1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database SystemConcepts”, Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan, ”An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006. 5. Raghu Ramakrishnan, Johannes Gehrke, “Database Management Systems”, McGraw Hill, Third Edition 2004

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
CO 1	2	1	1	0	0	1	1	0	0	0	0	0	2	0
CO 2	2	1	1	0	0	1	1	0	0	0	0	0	2	0
CO 3	2	1	1	0	0	1	1	0	0	0	0	0	2	0
CO 4	2	1	0	3	3	1	1	0	0	0	0	0	2	2
	8	4	3	3	3	4	4	0	0	0	0	0	8	2

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	8	4	3	3	3	4	4	0	0	0	0	0	8	2
Scaled to 0,1,2,3 scale	2	1	1	1	1	1	1	0	0	0	0	0	2	1

COURSE CODE	COURSE NAME	L	T	P	C
XCSE62	MOBILE COMPUTING AND COMMUNICATION	3	0	0	3
C:P:A= 3.8:1:0.2					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Understand*** the fundamentals of mobile communication	Cognitive	Understand Remember
CO2	***Understand*** the concepts of MAC and ***Compare*** various telecommunication systems.	Psychomotor and Cognitive	Understand Knowledge
CO3	***Describe*** the concepts of various Wireless LAN	Cognitive	Understand
CO4	***Explain*** the different Routing techniques in mobile network.	Cognitive	Understand Apply
CO5	***Understand*** different user interface protocols in mobile communications.	Cognitive	Understand Remember

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 NETWORK AND TRANSPORT LAYER **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 APPLICATION LAYER **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.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
	45	-	-	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

REFERENCES

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 COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	2	0	0	0	0	0	0	0	0	0	0	2	1
CO2	1	3	2	1	0	0	0	0	0	0	0	0	2	1
CO3	1	3	3	1	0	2	0	0	0	0	0	0	2	1
CO4	1	2	1	1	0	0	0	0	0	0	0	0	2	1
CO5	1	2	3	1	0	0	0	0	0	0	0	0	2	1
Total	7	12	9	4	0	0	0	0	0	0	0	0	10	5

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
Original	7	12	9	4	0	0	0	0	0	0	0	0	10	5
Scaled to	2	3	2	1	0	0	0	0	0	0	0	0	2	1

COURSE CODE	COURSE NAME	L	T	P	C
		3	0	0	3
XCSE63	INTERNET OF THINGS	L	T	P	H
C:P:A = 3:0:0		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	Get an idea of some of the application areas where Internet of Things can be applied.	Cognitive	Understand
CO2	***Understand*** the Standardization Protocol for IoT	Cognitive	Understand
CO3	***Understand*** the concepts of Web of Things.	Cognitive	Understand
CO4	***Understand*** the concepts of Cloud of Things with emphasis on Mobile cloud Computing.	Cognitive	Understand
CO5	***Understand*** the basic concepts of aspect oriented software development	Cognitive	Understand

UNIT I INTRODUCTION **9**

Definitions and Functional Requirements –Motivation – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview -Communication middleware for IoT –IoT Information Security.

UNIT II IoT PROTOCOLS **8**

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security.

UNIT III WEB OF THINGS **10**

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

UNIT IV IoT MODELS **9**

Integrated Billing Solutions in the Internet of Things Business Models for the Internet of Things - Network Dynamics: Population Models – Information Cascades - Network Effects - Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small-World Phenomenon.

UNIT V APPLICATION **8**

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.

LECTURE	TUTORIAL	TOTAL
45	-	45

REFERENCES

1. The Internet of Things in the Cloud: A Middleware Perspective - Honbo Zhou – CRC Press – 2012 .
2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011
3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010
4. The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
5. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012.

Mapping of COs with POs:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	4	12	0	3	1	0	0	0	0	0	0	0	6	0
Scaled to 0,1,2,3 scale	1	3	0	1	1	0	0	0	0	0	0	0	2	0

COURSE CODE	COURSE NAME	L	T	P	C
XCSE64	PROGRAMMING WITH PYTHON	3	0	0	3
		L	T	P	H
C:P:A = 3:0:0		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the evolution of python program and the handle installation process with different OS.	Cognitive	Remember
CO2	***Understand*** the data types and operators with dictionaries.	Cognitive	Remember ,Understand
CO3	***Understand*** the function and apply the recursive, regular expression and reduce & map.	Cognitive	Remember
CO4	***Understand*** and apply object oriented programming and handle graphics and interface	Cognitive	Remember , Understand
CO5	***Understand*** the application of python programming.	Cognitive	Knowledge

UNIT I INSTALLATION	6
Downloading and installation: overview of python – installing python on windows – installing python on Linux – feature – History and philosophy of python – interactive mode – structure with identification.	

UNIT II DATA TYPE AND STATEMENT	8
Identification- Data Types and Variables - Operators -input and raw input via the keyboard - Conditional Statements -While Loops -For Loops -Formatted output - Output with Print -Sequential Data Types - Dictionaries -Sets and Frozen Sets - Shallow and Deep Copy.	

UNIT III FUNCTION AND REGULAR EXPRESSION	10
Functions - Recursion and Recursive Functions - Tests, DocTests, UnitTests - Memoization and Decorators - Passing Arguments- Namespaces - Global vs. Local Variables- File Management -Modular Programming and Modules - Introduction in Regular Expressions - Regular Expressions, Advanced -Lambda Operator, Filter, Reduce and Map -List Comprehension- Generators	

UNIT IV OBJECT ORIENTED PROGRAMMING	9
Exception Handling - Object Oriented Programming - Inheritance Example - Slots - Classes and Class Creation -Road to Metaclasses -Metaclasses – files input and output - inheritance, polymorphism, operator overloading – Multithreading.	

UNIT V APPLICATION OF PYTHON PROGRAMMING	12
Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames-, Networks, and Client/Server Programming; introduction to HTML, interacting with remote HTML server, running html-based queries, downloading pages; CGI programming, programming a simple CGI form	

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS
1. Fundamentals of Python: First Programs Author: Kenneth Lambert Publisher: Course Technology, Cengage Learning, 2012 ISBN-13: 978-1-111-82270-5
E-REFERENCES
1. https://wiki.python.org/moin/BeginnersGuide/Overview 2. https://docs.python.org/2/license.html 3. http://www.python-course.eu/blocks.php 4. http://www.tutorialspoint.com/python

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CO 1		2						1				1	1	
CO 2		3						2				1	1	
CO 3	3	2	2			1						1	1	
CO 4	3	2	2									1	1	2
CO 5	3	2	2									1	1	2

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	9	11	6	-	-	1	-	3	-	-	-	5	5	4
Scaled to 0,1,2,3 scale	2	3	2	-	-	1	-	1				1	1	1

VII SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
XCSE71	NETWORK MEASUREMENTS AND TESTING	3	0	0	3
		L	T	P	C
C:P:A = 3:0:0		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the cellular network measurements.	Cognitive	Remember
CO2	***Describe, Explain*** the testing techniques.	Cognitive	Remember Understand
CO3	***Describe*** the basic telecommunication technologies.	Cognitive	Remember
CO4	***Understand t***he network test instruments	Cognitive	Understand
CO5	***Understand*** the performance monitoring.	Cognitive	Understand

UNIT I INTRODUCTION TO NETWORK TEST AND MEASUREMENTS	**9**
Introduction to telecommunication network measurements – Testing in the life cycle of the network - Private network performance testing.	
UNIT II CELLULAR NETWORK MEASUREMENTS AND TESTING	**9**
Introduction to cellular radio network - Cellular measurement strategies – Cellular measurement description - Cellular network life cycle testing.	
UNIT III BASIC TELECOMMUNICATION TECHNOLOGIES	**9**
Transmission media characteristics and measurement - Fiber optic network elements Timing and delay jitter - Protocol analysis.	
UNIT IV NETWORK TEST INSTRUMENTS	**9**
Analog measurement instrumentation - Bit error rate measurement and error performance analysis - Protocol analyzers - Optical testers - Distributed network monitoring - SDH and sonnet analyzers - Signaling system 7 testing.	
UNIT V NETWORK MANAGEMENT	**9**
Local area network management and performance monitoring - SS7 signaling monitoring system.	

LECTURE	TUTORIAL	TOTAL
45	0	45

TEXT BOOKS

1.Coombs Clyde, F, "*Communication Network: Test and Measurement Hand Book*", McGraw Hill Publication 2004.

REFERENCE

William Stallings, "*Wireless Communication and Networks*", Second Edition,Prentice Hall of India Publication, 2006.

2. J.F. Hayes, "*Modeling and Analysis of Computer Communication Networks*",Plenum Press, New York, 1994.

Mapping of COs with POs:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	4	12	0	3	1	0	0	0	0	0	0	0	6	0
Scaled to 0,1,2,3 scale	1	3	0	1	1	0	0	0	0	0	0	0	2	0

COURSE CODE	COURSE NAME	L	T	P	C
XCSE72	SOFTWARE TESTING	3	0	0	3
C:P:A = 3:0:0		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the testing principles and relate the tester's responsibility in software development organization.	Cognitive	Remember
CO2	***Describe, Explain*** *and* ***Demonstrate*** how to design appropriate test cases which will be suitable for software product to be tested	Cognitive	Remember Understand
CO3	***Describe*** *and* ***Demonstrate*** the knowledge of testing techniques.	Cognitive	Remember
CO4	***Describe*** *and* ***Explain*** how to plan for a software to be tested and the components and skills needed by a test specialist	Cognitive	Remember Understand
CO5	***Explain*** the types of reviews, its components and review results and ***Demonstrate*** the working of software testing tool using any programming language	Cognitive	Comprehension

UNIT I	INTRODUCTION	9

Testing as an Engineering Activity – Need of testing– Role of Process in Software Quality – Testing as a Process – Basic Definitions and terminologies – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository.

UNIT II	TEST CASE DESIGN	9

Introduction to Testing Design Strategies – The Smarter Tester – Test Case Design Strategies – Using Black Box Approach to Test Case Design Random Testing – Requirements based testing – Boundary Value Analysis – decision tables - Equivalence Class Partitioning state-based testing– cause effect graphing – error guessing - compatibility testing – domain testing Using White–Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing - Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White–box Based Test Design – code complexity testing – Evaluating Test Adequacy Criteria.

UNIT III	LEVELS OF TESTING	9

The Need for Levels of Testing – Unit Test – Unit Test Planning –Designing the Unit Tests. The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – scenario testing – defect bash elimination -System Testing – types of system testing - Acceptance testing – performance testing - Regression Testing – internationalization testing – ad-hoc testing - Alpha – Beta Tests – testing OO systems – usability and accessibility testing.

UNIT IV	TEST MANAGEMENT	9

Testing and Debugging Goals and Policies – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – Reporting Test Results – The role of three groups in Test Planning and Policy Development – Process and the Engineering Disciplines – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT V	CONTROLLING AND MONITORING	9
Measurement and Milestones for Controlling and Monitoring – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of reviews – Developing a review program – Components of Review Plans – Reporting review results – Testing Tools.		

LECTURE	TUTORIAL	TOTAL
45	-	45

TEXT BOOKS

1. Srinivasan Desikan and Gopalaswamy Ramesh, " Software Testing – Principles and Practices", Pearson education, 2010.
2. Aditya P.Mathur, "Foundations of Software Testing", Pearson Education, 2013.

REFERENCES

1. Boris Beizer, "Software Testing Techniques", Second Edition, Dreamtech, 2010
2. Elfriede Dustin, "Effective Software Testing", First Edition, Pearson Education, 2003.
3. Renu Rajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2011

E-RESOURCES

http://vlssit.iitkgp.ernet.in/isad/isad/
http://www.cs.umd.edu/~atif/Teaching/Fall2009/CMSC737.html

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	3	3	1	3				2	2	2	2	2	1
CO 2	2	3	3	2	3				3	3	1	1	3	2
CO 3	2	3	3	2	3				3	3	1	1	3	2
CO 4	3	2	2	1	2				3	3		1	3	2
CO 5	3	2	2	1	2				3	3		1	3	2
	11	13	13	7	13				14	14	4	6	14	9

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PSO 2
Original value	11	13	13	7	13				14	14	4	6	14	9
Scaled to 0,1,2,3 scale	3	3	3	2	3	0	0	0	3	3	1	2	3	2

COURSE CODE	COURSE NAME	L	T	P	C
XCSE73	XML AND WEB SERVICES	3	0	0	3
		L	T	P	H
C:P:A = 3:0:0		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Understand*** the use of web services in B2C and B2B applications.	Cognitive	Remember
CO2	***Understand*** the design principles and application of SOAP and REST based web services.	Cognitive	Remember
CO3	***Design*** collaborating web services according to a specification.	Cognitive	Remember
CO4	Implement an application that ***uses*** multiple web services in a realistic business scenario.	Cognitive	Remember
CO5	***Use*** industry standard open source tools such as Apache Axis2, Tomcat, Derby and Eclipse to build, test, deploy and execute web services and web applications that consume them.	Cognitive	Remember

UNIT I XML TECHNOLOGY FAMILY **9**

XML – benefits – Advantages of XML over HTML – EDL –Databases – XML based standards – DTD –XML Schemas – X- Files – XML processing – DOM –SAX presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH.

UNIT II ARCHITECTING WEB SERVICES **9**

Business motivations for web services – B2B – B2C- Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view –composition of web services – deployment view – from application server to peer to peer– process view – life in the runtime.

UNIT III WEB SERVICES BUILDING BLOCK **9**

Transport protocols for web services – messaging with web services – protocols – SOAP– describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad-Hoc Discovery – Securing web services.

UNIT IV IMPLEMENTING XML IN E-BUSINESS **9**

B2B - B2C Applications – Different types of B2B interaction – Components of ebusiness XML systems – ebXML – Rosetta Net Applied XML in vertical industry – Web services for mobile devices.

UNIT V XML AND CONTENT MANAGEMENT **9**

Semantic Web – Role of Meta data in web content – Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow –XLANG – WSFL.

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS

1. Ron schmelzer et al, "XML and Web Services", Pearson Education, 2008.
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.

REFERENCE

1. Frank P. Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
2. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.
3. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services", Apress, 2004.
4. Russ Basiura and Mike Batongbacal, "Professional ASP.NET Web Services", Apress,2. ASP .NET Web Services", Apress, 2003

Mapping of COs with POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO 1	1	3											1	
CO 2	1	3											2	
CO 3	1	3		1	1								3	
CO 4	1	3		2									1	
CO 5	1	3		1									1	
	4	12		3	1								6	

Original	5	15		4	1								8	
Scaled to 0,1,2,3 scale	1	3		1	1								2	

COURSE CODE	COURSE NAME	L	T	P	C
XCSE74	DISASTER MANAGEMENT	3	0	0	3
C:P:A = 2.75:0:0.25					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Understand*** and ***Recognize*** the concepts of disaster	Cognitive	Understand, Remember
CO2	***Recognize and describe*** the causes and effects of disaster	Cognitive	Understand, Remember
CO3	***Describe*** the various approaches of risk reduction	Cognitive	Understand
CO4	***Demonstrate*** the inter-relationship between disaster and development	Cognitive	Understand
CO5	Discuss hazard and vulnerability profile of India and respond to drills related to relief.	Cognitive	Understand

UNIT - I	INTRODUCTION TO DISASTERS	6

Concepts and definitions- Disaster, Hazard, Vulnerability, Resilience, Risks

UNIT - II	DISASTERS: CLASSIFICATION, CAUSES, IMPACTS	12

Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters, urban disasters, pandemics, complex emergencies, Climate change

UNIT - III	APPROACHES TO DISASTER RISK REDUCTION	10

Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.

UNIT - IV	INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT	6

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources

UNIT - V	DISASTER RISK MANAGEMENT IN INDIA	11

Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation).

The project / fieldwork to understand vulnerabilities, work on reduction of disaster risk and build a cultural safety.

	LECTURE	TOTAL
	45	45

TEXT BOOKS:

1. Coppola P Damon, “Introduction to International Disaster Management, Butterworth-Heinemann, 2015
2. K. N. Shastri, “Disaster Management in India”, Pinnacle Technology, 2012
3. Gupta Anil K, Sreeja S. Nair, “Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Lee Allyn Davis, “Natural Disasters”, Infobase Publishing, 2010
5. Andharia J, “Vulnerability in Disaster Discourse”, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008

REFERENCES:

1. Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000
2. Carter, Nick 1991. Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.

WEB SITES AND WEB RESOURCES:

1. NIDM Publications at http://nidm.gov.in- Official Website of National
2. Institute of Disaster Management (NIDM), Ministry of Home Affairs,
3. http://cwc.gov.in , http://ekdrm.net , http://www.emdat.be ,
4. http://www.nws.noaa.gov , http://pubs.usgs.gov , http://nidm.gov.ini
5. http://www.imd.gov.ini

Table 1: Mapping of CO with GA

Course outcomes	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA 10	GA 11	GA 12
CO1	1					3	2	1				1
CO2	1					3	2	1				1
CO3	1					3	2	1				1
CO4	1					3	2	1				1
CO5	1					3	2	1				1
Total	5					15	10	5				5
Scaled	1					3	2	1				1

Course Code	Course Name	L	T	P	C
XCSE75	ETHICAL HACKING	3	0	0	3
C: P: A = 3:0:0					
		L	T	P	H
		3	0	0	3

Prerequisite: Cyber Security

Course Outcomes		Domain	Level
Upon completion of this course, the student should be able to			
CO1	Learn about the importance of information security	Cognitive	Understand Analyse
CO2	Learn different scanning and enumeration methodologies and tools	Cognitive	Remember
CO3	Understand various hacking techniques and attacks	Cognitive	Understand Apply
CO4	Exposed to programming languages for security professionals	Cognitive	Understand Analyse Apply
CO5	Familiarize with the different phases in penetration testing	Cognitive	Understand

UNIT I - INTRODUCTION TO HACKING	**9**
Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hacktivism – Vulnerability Research – Introduction to Footprinting – Information Gathering Methodology – Footprinting Tools – WHOIS Tools – DNS Information Tools – Locating the Network Range – Meta Search Engines.	
UNIT II - SCANNING AND ENUMERATION	**9**
Introduction to Scanning – Objectives – Scanning Methodology – Tools – Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools.	
UNIT III - SYSTEM HACKING	**9**
Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing – Password Cracking Tools – Password Cracking Counter measures – Escalating Privileges –Executing Applications – Keyloggers and Spyware.	
UNIT IV - PROGRAMMING FOR SECURITY PROFESSIONALS	**9**
Programming Fundamentals – C language – HTML – Perl – Windows OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures – Linux OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures.	
UNIT V - PENETRATION TESTING	**9**

Introduction – Security Assessments – Types of Penetration Testing- Phases of Penetration Testing – Tools – Choosing Different Types of Pen-Test Tools – Penetration Testing Tools			
	LECTURE	**TUTORIAL**	**TOTAL**
	45	**0**	**45**
TEXT BOOKS			
1. Ec-Council, "Ethical Hacking and Countermeasures: Attack Phases", Delmar Cengage Learning, 2009. 2. Michael T. Simpson, Kent Backman, James E. Corley, "Hands-On Ethical Hacking and Network Defense", Cengage Learning, 2012.			
REFERENCES			
6. Patrick Engebretson, "The Basics of Hacking and Penetration Testing – Ethical Hacking and Penetration Testing Made Easy", Syngress Media, Second Revised Edition, 2013. 7. Jon Erickson, "Hacking: The Art of Exploitation", No Starch Press, Second Edition, 2008.			

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2
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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	11	13	13	13	8	2	7	7	6	0	0	0	9	6
Scaled to 0,1,2,3 scale	3	3	3	3	2	1	2	2	2	0	0	0	2	2

COURSE CODE	COURSE NAME	L	T	P	C
XCSE76	ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM	3	0	0	3
C:P:A = 3:0:0		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	Represent knowledge using propositional calculus and predicate calculus.	Cognitive	Remember
CO2	Use inference rules to produce predicate calculus expression.	Cognitive	Remember , Understand
CO3	Solve problems using search techniques: depth-first, breadth-first, forward chaining, backward chaining, best-first, branch-and-bound, and-or-graph, and heuristic search.	Cognitive	Remember
CO4	Analyze and design a fuzzy logic system using fuzzy logic and neural network tool box.	Cognitive	Remember , Understand
CO5	Analyze and design a rule-based expert system. Design a machine vision system application	Cognitive	Comprehension

UNIT I INTRODUCTION 9

General Issues and overview of AI The AI problems: what is an AI technique; Characteristics of AI applications Problem Solving, Search and Control Strategies General Problem solving; Production systems; Control strategies; forward and backward chaining Exhaustive searches: Depth first Breadth first search.

UNIT II SEARCHING TECHNIQUE 9

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 LOGICS IN AI 9

Knowledge Representation First Order Predicate Calculus; Skolemnisation; Resolution Principle and Unification; Inference Mechanisms Horn's Clauses; Semantic Networks; Frame Systems and Value Inheritance; Scripts; Conceptual Dependency AI Programming Languages Introduction to LISP, Syntax and Numeric Function; List manipulation functions; Iteration and Recursion; Property list and Arrays, Introduction to PROLOG.

UNIT IV NATURAL LANGUAGE PROCESSING 9

Natural Language Processing and Parsing Techniques Context – Free Grammar; Recursive Transition Nets (RTN); Augmented Transition Nets (ATN); Semantic Analysis, Case and Logic Grammars; Planning Overview – An Example Domain: The Blocks Word; Component of Planning Systems; Goal Stack Planning (linear planning); Non-linear Planning using constraint posting; Probabilistic Reasoning and Uncertainty; Probability theory; Bayes Theorem and Bayesian networks; Certainty Factor.

UNIT V EXPERT SYSTEM			9
Expert Systems Introduction to Expert Systems, Architecture of Expert Systems; Expert System Shells; Knowledge Acquisition; Case Studies; MYCIN, Learning, Rote Learning; Learning by Induction; explanation based learning.			
	LECTURI	**TUTORIAL**	**TOTAL**
	45	**-**	**45**
TEXT BOOKS			
1. Elaine Rich and Kevin Knight: Artificial Intelligence – Tata McGraw Hill. 2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hal of India.			
REFERENCES			
1. Nils J. Nilsson: Principles of Artificial Intelligence – Narosa Publication house. 2. Artificial Intelligence: A Modern Approach, Stuart Rusell, Peter Norving, Pearson Education 2nd Edition. 3. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education. 4. Artificial Intelligence by Gopal Krishna, Janakiraman.			

Mapping of COs with POs:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	5	13	0	3	1	0	0	0	0	0	0	0	6	0
Scaled to 0,1,2,3 scale	1	3	0	1	1	0	0	0	0	0	0	0	2	0

COURSE CODE	COURSE NAME	L	T	P	C
XCSE77	DESIGN AND ANALYSIS OF PARALLEL ALGORITHMS	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Illustrate*** and ***analyze*** Cost optimal algorithms and measure Performance of its.	Cognitive	Understand & Apply
CO2	***Explain*** various tree algorithms and problem solving techniques.	Cognitive	Understand Level
CO3	C***ompare*** various sorting and searching techniques	Cognitive	Create, Apply
CO4	***Explain*** Spanning tree concepts and apply it to **construct** network with minimum cost.	Cognitive	Understand & Apply
CO5	***Apply*** problem solving techniques to various application.	Cognitive	Understand & Apply

UNIT I	INTRODUCTION	9

Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Cost optimality, An example of illustrate Cost-optimal algorithms- such as summation, Min/Max on various models.

UNIT II	SEARCHING AND MATRIX	9

Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding. Bridges.

UNIT III	TREES	9

Techniques – Balanced Trees, Pointer Jumping, Divide and Conquer, Partitioning, Pipelining, Systolic Computation, Accelerated Cascading, Prefix Computation, List Ranking, Euler Tour, Tree Contraction.

UNIT IV	SORTING TECHNIQUES	9

Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC/, Parallel Sorting Networks on CREW/EREW/MCC/, linear array.

UNIT V	GRAPHS	9

Graph Algorithms – Connected Components, Spanning Trees, Shortest Paths. Complexity – NC Class and P-Completeness.

	LECTURE	TUTORIAL	TOTAL
	45	0	45

REFERENCES

1. The Design and Analysis of Parallel Algorithms – Akl S.G. *Prentice Hall, EnglewoodCliffs,NewJersey 07632* (PHI).1989.
2. Analysis and Design of Parallel Algorithms: Arithmetic and Matrix Problems – Lakshmivarahan S., Dhall S.K. (McGraw-Hill).1990.
3. S. Baase, S and A. Van Gelder, "Computer Algorithms: Introduction to Design and Analysis", 3rd edition. Addison Wesley, 2000
4. Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms”, Addison Wesley
5. Horowitz, Sahni, “Fundamentals of Computer Algorithm”, Galgotia 2014

Mapping of COs with POs:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original value	7	9	5	3									8	-
Scaled to 0,1,2,3 scale	2	2	1	1									2	0

Course Code	Course Name	L	T	P	C
XCSE78	GAME THEORY	3	0	0	3
C: P: A = 3:0:0					
		L	T	P	H
		3	0	0	3

Prerequisite: Maths (Linear Algebra, Economics, Statistics, and Probability)

Course Outcomes		Domain	Level
Upon completion of this course, the student should be able to			
CO1	Discuss the notion of a strategic game and equilibria, and identify the characteristics of main applications of these concepts.	Cognitive	Understand Analyse
CO2	To formalize the notion of strategic thinking and rational choice by using the tools of game theory, and to provide insights into using game theory in modeling applications	Cognitive	Remember
CO3	To draw the connections between game theory, computer science, and economics, especially emphasizing the computational issues	Cognitive	Understand Apply
CO4	To introduce contemporary topics in the intersection of game theory, computer science, and economics	Cognitive	Understand Analyse Apply
CO5	Implement a typical Virtual Business scenario using Game theory	Cognitive	Understand

UNIT I - INTRODUCTION	**9**
. Introduction – Making rational choices: basics of Games – strategy - preferences – payoffs – Mathematical basics - Game theory – Rational Choice - Basic solution concepts-non-cooperative versus cooperative games - Basic computational issues - finding equilibria and learning in games- Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets).	
UNIT II - GAMES WITH PERFECT INFORMATION	**9**
Games with Perfect Information - Strategic games - prisoner's dilemma, matching pennies- Nash equilibria- theory and illustrations - Cournot's and Bertrand's models of oligopoly- auctions- mixed strategy equilibrium- zero-sum games- Extensive Games with Perfect Information-repeated games (prisoner's dilemma)- subgame perfect Nash equilibrium; computational issues.	
UNIT III - GAMES WITH IMPERFECT INFORMATION	**9**
Games with Imperfect Information - Bayesian Games – Motivational Examples – General Definitions –Information aspects – Illustrations - Extensive Games with Imperfect -Information - Strategies- Nash Equilibrium – Beliefs and sequential equilibrium – Illustrations - Repeated Games – The Prisoner's Dilemma – Bargaining	
UNIT IV - NON-COOPERATIVE GAME THEORY	**9**

Non-cooperative Game Theory - Self-interested agents- Games in normal form - Analysing games: from optimality to equilibrium - Computing Solution Concepts of Normal-Form Games – Computing Nash equilibria of two-player, zero-sum games - Computing Nash equilibria of two-player, general-sum games - Identifying dominated strategies

UNIT V - MECHANISM DESIGN	**9**

Aggregating Preferences-Social Choice – Formal Model- Voting - Existence of social functions - Ranking systems - Protocols for Strategic Agents: Mechanism Design - Mechanism design with unrestricted preferences- Efficient mechanisms - Vickrey and VCG mechanisms (shortest paths) - Combinatorial auctions - profit maximization Computational applications of mechanism design - applications in Computer Science - Google's sponsored search - eBay auctions

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

TEXT BOOKS

3. M. J. Osborne, “An Introduction to Game Theory”, Oxford University Press, 2003.
4. N. Nisan, T. Roughgarden, E. Tardos, and V. V. Vazirani, “Algorithmic Game Theory”, Cambridge University Press, 2007.
5. M. J. Osborne and A. Rubinstein, “A Course in Game Theory”, MIT Press, 1994.

REFERENCES

8. A.Dixit and S. Skeath, “Games of Strategy”, W W Norton & Co Inc, 3rd Edition 2009.
9. YoavShoham, Kevin Leyton-Brown, “Multi agent Systems: Algorithmic, Game-Theoretic, and Logical Foundations”, Cambridge University Press, 2008.
10. Zhu Han, Dusit Niyato, Walid Saad, Tamer Basar and Are Hjorungnes, “Game Theory in Wireless and Communication Networks”, Cambridge University Press, 2012.

Mapping of COs with POs:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	11	13	13	13	8	2	7	7	6	0	0	0	9	6
Scaled to 0,1,2,3 scale	3	3	3	3	2	1	2	2	2	0	0	0	2	2

VIII SEMESTER ELECTIVES

COURSE CODE	COURSE NAME	L	T	P	C
XCSE81	DIGITAL IMAGE PROCESSING	3	0	0	3
		L	T	P	C
C:P:A= 2.6:0:0.4		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** how digital images are represented and manipulated in a computer	Cognitive	Remember
CO2	***Explain, Compare*** **and** ***Contrast*** various image transforms techniques.	Cognitive	Understand, Analysis
CO3	***Describe*** and ***Apply*** the knowledge of image enhancement and restoration techniques in different applications.	Cognitive	Remember , Apply
CO4	***Explain*** and ***Apply*** the age segmentation methods for a particular application.	Cognitive	Understand , Apply
CO5	***Compare*** and ***Analyze*** various image compression techniques.	Cognitive	Understand, Apply

UNIT I	DIGITAL IMAGE FUNDAMENTALS	9

Digital image – applications of digital image processing – elements of digital image processing systems – vidicon camera – line scan CCD sensor – area sensor – flash A/D converter – display – elements of visual perception – structure of the human eye – luminance – brightness – contrast – mach band effect – image fidelity criteria – color models, mathematical preliminaries of 2D systems – convolution – Fourier transform – ZS transform.

UNIT II	IMAGE TRANSFORM	9

Properties of unitary transform – 2D DFT- DCT- DST- Discrete wavelet transform – Discrete Hadamard – Walsh – Hotelling transform – SVD transform – Slant, Haar transforms.

UNIT III	IMAGE ENHANCEMENT AND RESTORATION	9

Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic mean filters, Homomorphic filtering.

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.

UNIT IV	IMAGE SEGMENTATION	9

Pixel based approach – feature threshold – choice of feature - optimum threshold - threshold selection methods – Edge detection, Edge linking via Hough transform -region

based approach – region growing – region splitting – region merging, split and merge.

UNIT V	**IMAGE COMPRESSION**	**9**

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

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

TEXT BOOKS :

1. Rafel C. Gonzalez and Richard E. Woods, Digital Image Processing", Pearson Edn. 2012.
2. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 2010.

REFERENCES :

1. William K. Pratt, "Digital Image Processing", John Wiley, NJ, 2010.
2. Sid Ahmed M.A., "Image Processing Theory, Algorithm and Architectures", McGraw-Hill, 2010

E-References:

1. https://see.stanford.edu/Course/EE261
2. http://nptel.ac.in/video.php?COURSEjectId=117105079
3. https://www.youtube.com/watch?v=CVV0TvNK6pk
4. https://www.coursera.org
5. https://www.cs.nmt.edu/~ip/lectures.html
6. http://www.siue.edu/~sumbaug/439_syl.html

	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
CO 1	2	2			2				1	1		2	2	1
CO 2	2	2	1	1	3				3	3		2	3	3
CO 3	3	2	1	2	3				3	3		2	3	3
CO 4	3	3	2	2	3				3	3		2	3	3
CO 5	2	2	1	1	3				1	3		2	3	2
	12	11	5	6	14				11	13		10	14	12

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original value	12	11	5	6	14				11	13		10	14	12
Scaled to 0,1,2,3 scale	3	3	1	2	3	0	0	0	3	3	0	2	3	3

COURSE CODE	COURSE NAME	L	T	P	C
XCSE82	INFORMATION RETRIEVAL	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Define*** and Explain document and query structure.	Cognitive	Remember
CO2	***Explain, Develop*** and ***Estimate*** query matching and text analysis.	Cognitive	Understand, Application
CO3	***Explain*** and ***Measure*** information retrieval performances.	Cognitive	Understand, Evaluation
CO4	***Explain*** and ***Estimate*** performance improvement measures.	Cognitive	Understand, Application
CO5	***Explain*** web search, crawling and link analysis.	Cognitive	Understand.

UNIT I	DOCUMENT AND QUERY STRUCTURE	9

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.

UNIT II	QUERY MATCHING AND TEXT ANALYSIS	9

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.

UNIT III	PERFORMANCE MEASURES	6

Binary versus N-ary measures – precision and recall – user oriented measures – average precision and recall – operating curves and single measures – expected search length.

UNIT IV	PERFORMANCE IMPROVEMENT TECHNIQUES	12

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.

UNIT V	WEB SEARCH AND LINK ANALYSIS	9
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**

TEXT BOOKS

1. Robert *R. Korfhage*, *Information storage and retrieval*, John *Wiley* & Sons, Inc., New York, NY, *1997*
2. C. Manning, P. Raghavan, and H. Schütze , *Introduction to Information Retrieval*, Cambridge University Press, 2008

REFERENCE BOOKS

1. Baeza-*Yates* and B. Ribeiro-Neto. *Modern Information*. *Retrieval*. *Addison Wesley*, 1999
2. Gerard *Salton* and M. J. *McGill*. *Introduction to Modern Information Retrieval*. *McGraw Hill* Book Co.,. New York, *1983*.
3. C. J. van RIJSBERGEN, *The geometry of information retrieval,* , Cambridge University Press, 2004

Mapping of COs with POs:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	11	11	9	5	5	3	5	1	0	0	5	5	11	11
Scaled to 0,1,2,3 scale	3	3	2	1	1	1	1	0	0	0	1	1	3	3

COURSE CODE	COURSE NAME	L	T	P	C
XCSE83	WIRELESS SENSOR NETWORKS	3	0	0	3
C:P:A= 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe, understand*** the basic WSN technology and supporting protocols, with emphasis placed on standardization basic sensor systems and provide a survey of sensor technology.	Cognitive	Knowledge, Understand
CO2	***Describe, understand*** the medium access control protocols and address physical layer issues.	Cognitive	Knowledge, Understand
CO3	***Describe*** and ***explain*** the key routing protocols for sensor networks and main design issues.	Cognitive	Knowledge, Understand
CO4	***Describe*** and ***explain*** the sensor network middleware, operating systems and design requirements.	Cognitive	Knowledge, Understand
CO5	***Describe, understand*** the Sensor management, Performance Modeling and Case Study.	Cognitive	Knowledge, Understand

` UNIT-I	**INTRODUCTION AND OVERVIEW OF WIRELESS SENSOR NETWORKS**	9
	Introduction – Basic Overview of the Technology- Applications of Wireless Sensor Networks- Basic Wireless Sensor Technology.	
UNIT –II	**WIRELESS SYSTEMS AND MAC PROTOCOLS**	9
	Wireless Transmission Technology and Systems- Radio Technology Primer -Available Wireless Technologies -Medium Access Control Protocols-Fundamentals of MAC Protocols -MAC Protocols for WSNs -Sensor-MAC Case Study-IEEE 802.15.4.	
UNIT-III	**ROUTING AND TRANSPORT CONTROL PROTOCOLS**	9
	Routing Protocols for Wireless Sensor Networks- Data Dissemination and Gathering -Routing Challenges and Design Issues -Routing Strategies-Transport Control Protocols-Design Issues-Examples-Performance.	
UNIT -IV	**MIDDLEWARE AND OPERATING SYSTEMS**	9
	Middleware - Principles -Architecture -Existing Middleware -Introduction to Operating Systems-Design Issues- Examples of Operating Systems.	
UNIT V	**WIRELESS SENSOR NETWORK MANAGEMENT**	9
	Network Management Requirements - Traditional Network Management Models -Design Issues -Management Architecture –Naming- Localization-Performance and Traffic Management-Design Issues-Performance Modeling-Case Study.	

	LECTURE	TUTORIAL	TOTAL
	45	-	45

TEXT BOOKS

1. KazemSohraby, Daniel Minoli, & TaiebZnati, “Wireless Sensor Networks- Technology
,Protools,and Applications”,John Wiley,2007

REFERENCES

1. Holger Karl & Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, “Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
3. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

E- REFERENCES

1. http://nptel.ac.in/courses/114106035/37#.

Mapping of COs with POs:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	11	11	9	5	5	3	5	1	0	0	5	5	11	11
Scaled to 0,1,2,3 scale	3	3	2	1	1	1	1	0	0	0	1	1	3	3

COURSE CODE	COURSE NAME	L	T	P	C
XCSE84	EMBEDDED SYSTEMS AND PLC	3	0	0	3
C:P:A: 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** Processors and Hardware used in embedded system.	Cognitive	Remember ,Understand level
CO2	**Explain** Different protocols used in embedded system	Cognitive	Understand level
CO3	**Create** different application Using embedded system and PLC Programming languages.	Psychomotor	Understand, Apply level
CO4	**Explain** different sensors and its applications	Cognitive	Knowledge, apply
CO5	**Apply** the sensors in embedded system And PLC circuits to implement different applications	Cognitive	Understand & Apply

UNIT I EMBEDDED SYSTEM BASICS **9**

Definition and classification − Overview of processors and hardware units in an embedded system − Software embedded into the system − Exemplary embedded systems − Embedded systems on a chip (Soc) − Use of VLSI designed circuits**.**

UNIT II DEVICES AND BUSES FOR DEVICES NETWORK **9**

I/O Devices − Device I/O types and examples − Synchronous − ISO-Synchronous and asynchronous communications from serial devices − Examples of internal serial-Communication devices − UART and HDLC − Parallel port devices – Sophisticated interfacing features in devices/ports − Timer and counting devices − 12C- USB − CAN and advanced I/O serial high speed buses − ISA − PCI − PCIX − CPCI and advanced buses.

UNIT III PROGRAMMING CONCEPTS **9**

PROGRAMMING IN C and C++ Programming in assembly language (ALP) Vs high level language − C program elements − Macros and functions − Use of function calls − Multiple function calls in a cyclic order in the main function pointers − Function queues and interrupt service routines − Queues − Pointers − Concepts of embedded programming in C++ − Objected Oriented Programming − Embedded programming in C++ − C program compilers − Cross compiler − Optimization of memory codes.

UNIT IV PLC INTRODUCTION **9**

Advantages of plc ,Architecture of plc control panel, Functions of various block in plc, Different type of input/output circuits, Programming methods, Programming devices, Basic instructions NO and NC concepts, Boolean gates symbols truth tables, ladder logic, concepts of latching and unlatching, Timers and counters, Maintenance and trouble shooting of plc, applications of plc.

UNIT V PLC IMPLEMENTATION			9
Study of use of various Sensors (Limit Switches, Potentiometer, Proximity, Color, Photoelectric & Temperature Sensors) & Actuators PLC Wiring, PLC Logical Commands, Arithmetic Commands, High Speed Processing Commands, Sequential Logics, Data Transmission Commands, PLC Interfacing with VFD, Automatic Motor Control Circuit designing using Ladder Logic.			
	LECTURE	**TUTORIAL**	**TOTAL**
	45	**0**	**45**
TEXT BOOKS			
1 Raj Kamal Embedded Systems -, TMH-2011 2. W. Bolton Programmable Logic controllers-Newnes,2009			
REFERENCES			
1. Shibu K.V ,Introduction to Embedded Systems - Mc Graw Hill.2009 2. Frank Vahid, Tony Givargis, John Wiley, Embedded System Design ,2002 3. Lyla, Embedded Systems –Pearson, 2013 4. David E. Simon, An Embedded Software Primer - Pearson Education			

Mapping of COs with POs:

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

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original	4	12	0	3	1	0	0	0	0	0	0	0	6	0
Scaled to 0,1,2,3 scale	1	3	0	1	1	0	0	0	0	0	0	0	2	0

COURSE CODE	COURSE NAME	L	T	P	C
XCSE85	SERVICE ORIENTED ARCHITECTURE	3	0	0	3
C:P:A: 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the basic principles of service orientated architecture with user interaction.	Cognitive	Knowledge
CO2	***Explain*** the message passing techniques in SOA	Cognitive	Knowledge
CO3	***Understand*** the applications of SOA.	Cognitive	Knowledge
CO4	***Describe*** different kind of platforms in SOA,	Cognitive	Knowledge
CO5	***Understand*** the various encoding and security in Web services.	Cognitive	Knowledge

UNIT I INTRODUCTION TO SOA **10**

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation**.**

UNIT –II WEB SERVICES **8**

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design –Application service design – Task- centric business service design**.**

UNIT-III SERVICE ORIENTED ANALYSIS **10**

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design –Application service design – Task- centric business service design.

UNIT –IV SOA WITH .NET AND JAVA **9**

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE).

UNIT V WEB SERVICES **8**

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WS- Security

	LECTURE	TUTORIAL	TOTAL
	45	0	45

TEXT BOOKS

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005.

REFERENCES

1. Thomas Erl, "SOA Principles of Service Design "(The Prentice Hall Service-Oriented Computing Series from Thomas Erl), 2005.
2. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
3. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.
4. Dan Woods and Thomas Mattern, "Enterprise SOA Designing IT for Business Innovation" O'REILLY, First Edition, 2006

COURSE CODE	COURSE NAME	L	T	P	C
XCSE86	ADVANCED COMPUTER ARCHITECTURE	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the instruction level parallelism	Cognitive	Remember
CO2	***Describe*** the instruction level parallelism	Cognitive	Remember ,Understand
CO3	***Describe*** *, the concept of memory and I/O.*	Cognitive	Remember
CO4	***Describe*** *, the concept of I/O.*	Cognitive	Remember , Understand
CO5	***Explain*** multicore architecture.	Cognitive	Comprehension

UNIT I INSTRUCTION LEVEL PARALLELISM	9
ILP – Concepts and challenges – Hardware and software approaches – Dynamic scheduling – Speculation - Compiler techniques for exposing ILP – Branch prediction.	

UNIT II MULTIPLE ISSUE PROCESSORS	9
VLIW & EPIC – Advanced compiler support – Hardware support for exposing parallelism – Hardware versus software speculation mechanisms – IA 64 and Itanium processors – Limits ILP.	

UNIT III MULTIPROCESSORS AND THREAD LEVEL PARALLELISM	9
Symmetric and distributed shared memory architectures – Performance issues – Synchronization – Models of memory consistency – Introduction to Multithreading.	

UNIT IV MEMORY AND I/O	9
Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time –Main memory and performance – Memory technology. Types of storage devices –Buses – RAID – Reliability, availability and dependability – I/O performance measures –Designing an I/O system	

UNIT V MULTI-CORE ARCHITECTURES	9
Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture – heterogenous multi-core processors – case study: IBM Cell Processor.	

	LECTURE	PRACTICAL	TOTAL
	45	0	45

TEXT BOOKS

1. John L. Hennessey and David A. Patterson, " Computer architecture – A quantitative approach", Morgan Kaufmann / Elsevier Publishers, 5th. edition, 2011.

REFERENCES

1. David E. Culler, Jaswinder Pal Singh, "Parallel computing architecture : A hardware/software approach" , Morgan Kaufmann /Elsevier Publishers, 5th Edition 2012
2. Kai Hwang and Zhi.Wei Xu, "Scalable Parallel Computing", Tata McGraw Hill,New Delhi, 2003.

E-REFERENCES

1. http://cse10-iitkgp.virtual-labs.ac.in/
2. https://www.seas.gwu.edu/~bhagiweb/cs211/lectures/lectures.html

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	2	3	2	2	1	1	0	0	0	2	2	3	1
CO 2	3	2	3	1	2	1	2	0	0	0	1	1	3	1
CO 3	3	2	2	2	2	1	1	0	0	0	3	1	3	1
CO 4	3	2	2	1	2	1	1	0	0	0	1	1	3	1
CO 5	3	2	3	2	1	1	1	0	0	0	2	1	3	1
	15	10	13	8	9	5	6	0	0	0	9	6	15	5

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
Original value	15	10	13	8	9	5	6	0	0	0	9	6	15	5
Scaled to 0,1,2,3 scale	3	3	3	2	2	1	2	0	0	0	2	2	3	1

COURSE CODE	COURSE NAME	L	T	P	C
XCSE87	SOFT COMPUTING	3	0	0	3
C:P:A = 3:0:0					
		L	T	P	H
		3	0	0	3

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Describe*** the Neural Networks.	Cognitive	Remember
CO2	***Describe*** back propagation concepts.	Cognitive	Remember ,Understand
CO3	***Describe*** *the concept of Fuzzy logic.*	Cognitive	Remember
CO4	***Describe*** *the concepts of Fuzzy membership rules.*	Cognitive	Remember , Understand
CO5	***Explain*** the Genetic Algorithm (GA) **.**	Cognitive	Comprehension

UNIT I NEURAL NETWORKS-1 (INTRODUCTION & ARCHITECTURE) **9**

Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory

UNIT II NEURAL NETWORKS-II (BACK PROPAGATION NETWORKS& ARCHITECTURE) **9**

Perceptron model, solution, single layer artificial neural network, multilayer perception model; back propagation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications

UNIT III FUZZY LOGIC-I (INTRODUCTION) **9**

Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

UNIT IV FUZZY LOGIC –II **9**

(Fuzzy Membership, Rules) Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications.

UNIT V GENETIC ALGORITHM(GA) **9**

Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications.

LECTURE	PRACTICAL	TOTAL
45	0	45

TEXT BOOK

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, "Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications" Prentice Hall of India.2003

2. N.P.Padhy,"Artificial Intelligence and Intelligent Systems" Oxford University Press.2005

REFERENCES

1. Siman Haykin,"Neural Netowrks"Prentice Hall of India.1999.

2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India. 3rd Edition,2010

3. Kumar Satish, "Neural Networks" Tata Mc Graw Hill.2004

Mapping of COs with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	2	3	2	2	1	1				2	2	3	1
CO 2	3	2	3	1	2	1	2				1	1	3	1
CO 3	3	2	2	2	2	1	1				3	1	3	1
CO 4	3	2	2	1	2	1	1				1	1	3	1
CO 5	3	2	3	2	1	1	1				2	1	3	1
	15	10	13	8	9	5	6	0	0	0	9	6	15	5

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
Original value	15	10	13	8	9	5	6	0	0	0	9	6	15	5
Scaled to 0,1,2,3 scale	3	3	3	2	2	1	2	0	0	0	2	2	3	1

ONE CREDIT COURSES

			Web Design using JOOMLA Content Management System	L	T	P	C
				.5	-	.5	1
C	P	A		L	T	P	H
				1	0	1	2

PREREQUISITE: HTML and Designing Tools

COURSE OUTCOMES		Domain	Level
After the completion of the course, students will be able to			
CO1	***Understand*** and **perform***the* *l*earning principles and techniques of client-side programming with HTML5.	Cognitive Psychomotor	Understanding Guided Response
CO2	**Understand, demonstrate** and ***use***the Joomla Tool.	Cognitive Psychomotor	Understanding Apply Guided Response

UNIT I - HTML5 **(06)**

HTML5 – Overview – Syntax – Attributes – Events – Web Forms 2.0 – SVG – Math ML - Web Store – Web SQL Database – Server Sent Events - Web Sockets – Canvas – Audio and Video – Geolocation – microdata – Drag and Drop – Web Workers – IndexDDB – Web Messaging – CORS – Web RTC

UNIT II JOOMLA BASICS **(06)**

Introduction – Installation – Architecture – Control Panel – Toolbar – Menus – Content Menu – Components Menu – Extensions Menu – Help Menu.

UNIT III JOOMLA MENUS **(06)**

Create Menus – Adding Menu Items – Modifying Menu Items – Creating Submenus

UNIT IV JOOMLA MODULES **(06)**

Create Modules – Breadcrumb Module – Feed Display Module – Footer Module – Latest News module - Search Module – Random Image Module – Who's Online Module – Syndicate module – Donation Module

UNIT V JOOMLA ADVANCED **(06)**

Template Manager – Customize Template – Adding Template – Creating Template – Customize Logo – Category Management – Adding Content – Formatting Content – Article Metadata – Adding Banners – Adding Contacts – Adding News Feed – Adding Forum – Adding Web links – Plugin Manager – Extension Manager – Website Backup – Website SEO.

LECTURE	TUTORIAL	PRACTICAL	TOTAL
15	0	15	30

TEXT BOOKS

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 CEE (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, XML and AJAX, Black Book”, Dreamtech Press, 2009.
5. Jennifer Marriott, Elin Waring, “The Official Joomla! Book – 2nd Edition”, Addison-Wesley Professional, 2012.

REFERENCES

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.

E REFERENCES

1. https://docs.oracle.com/cd/E19957-01/816-6408-10/contents.htm
2. http://docs.oracle.com/javase/7/docs/technotes/guides/scripting/programmer_guide/
3. http://www.w3schools.com/js/default.asp
4. https://www.joomla.org/
5. https://downloads.joomla.org/
6. https://docs.joomla.org/
7. https://extensions.joomla.org/
8. https://www.tutorialspoint.com/joomla/
9. http://www.tutorialspoint.com/html5/

			R PROGRAMMING	L	T	P	C
				.5	-	.5	1
C	P	A		L	T	P	H
				1	-	1	2

PREREQUISITE: Basic Mathematical and Statistical Concepts

COURSE OUTCOMES:

Course Outcomes	Domain	Level
After the completion of the course, students will be able to		
CO1: ***List*** motivation for learning a programming language ***Access*** online resources for R and import new function packages into the R workspace	Cognitive Psychomotor	Understanding Guided Response
CO2: ***Recognize*** and make appropriate use of different types of data structures ***Identify And Implement*** appropriate control structures to solve a particular programming problem ***Create*** sophisticated figures and graphs	Cognitive Psychomotor	Apply Guided Response

UNIT I INTRODUCTION **(15)**

Installing R on Various Operating Systems-Installing R on Windows from CRAN Website-Installing RStudio on Various Operating Systems-R Packages-Installing an R Package-Importing Files in R: Importing an Excel File- Importing a CSV File- Exporting Files from R.Hands- on- Exercise on - Installing R & R studio - R Console

UNIT II WORKING WITH R **(15)**

Introduction-Overview and History of R-Data Types:Types of Data Structures in R- R Objects and Attributes-Vectors and Lists- Arrays -Matrices-Factors- Data Frames -Missing Values-Names Attribute-Control Structures: Introduction-If-else-For loops-While loops-Repeat, Next, Break, Function-Basic Plotting-Simulation.

1. Hands-on Exercise on Data types (Vectors, Matrix, Factor, Data Frames)
2. Hands- on Exercise on Basic Graphs(Bar, Pie and Histograms)

LECTURE	TUTORIAL	PRACTICAL	TOTAL
15	-	15	30

TEXT BOOKS

1. Grolemund , Garrett , "Hands-On Programming with R", Paperback – 2014 2. Norman Matloff, "The Art of R Programming" ,A Tour of Statistical Software Design Paperback , Oct 2011
REFERENCES
1. "A First Course in Statistical Programming with R" by Braun & Murdoch 2. "A Beginner´s Guide to R" by Zuur 3. "Introduction to Scientific Programming and Simulation Using R" by Chapman & Hall/CRC 4. "R in a Nutshell" by Adler 5. "An Introduction to R" by Venables& Smith
E-REFERENCES
1. https://www.programiz.com/r-programming 2. https://www.tutorialspoint.com/r/ 3. https://www.rstudio.com/online-learning/ 4. https://www.r-project.org/about.html

			INTERNET OF THINGS	L	T	P	C
				.5	-	.5	1
C	P	A		L	T	P	H
				1	0	1	2

PREREQUISITE: Internet Technologies

COURSE OUTCOMES:

Course Outcomes	Domain	Level
After the completion of the course, students will be able to		
CO1: ***Understand*** State of the Art – IoT Architecture ***Performs*** data organization in worksheet with variety of samples	Cognitive Psychomotor	Understanding Guided Response
CO2: ***Understand****the* overviewIoT Platform ***Programming*** of Raspberry Pi3	Cognitive Psychomotor	Understanding Guided Response
CO3: ***Understand*** building blocks of Internet of Things and characteristics ***Evaluate*** networking technologies for application within IoT projects	Cognitive Psychomotor	Apply Guided Response
CO4:Understand***and apply*** *the concepts IoT protocols, Security aspects.*	Cognitive Psychomotor	Apply Guided Response
CO5:***Describe and Evaluate*** *different applications of the IoT.* Able to investigate and propose various requirements of IoT for real world applications.	Cognitive Psychomotor	Understanding Set

UNIT I BASICS KNOWLEDGE OF IOT **(06)**

The IoT Networking Core : Technologies involved in IoT Development: Internet/Web and Networking Basics OSI Model, Data transfer referred with OSI Model, IP Addressing, Point to Point Data transfer, Point to Multi Point Data transfer & Network Topologies, Sub-netting, Network Topologies referred with Web, Introduction to Web Servers, Introduction to Cloud Computing.

UNIT II IOT PLATFORM OVERVIEW **(06)**

IoT Platform overview Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards.

UNIT III COMPONENTS OF IOT **(06)**

Network Fundamentals: Overview and working principle of Wired Networking equipment's – Router, Switches, Overview and working principle of Wireless Networking equipment's – Access Points, Hubs etc. Linux Network configuration Concepts: Networking configurations in Linux Accessing Hardware & Device Files interactions.

UNIT IV IOT PROTOCOLS AND APPLICATIONS			**(06)**
History of IoT, M2M – Machine to Machine, Web of Things, IoT protocols Applications: Remote Monitoring & Sensing, Remote Controlling, Performance Analysis The Architecture The Layering concepts, IoT Communication Pattern, IoT protocol Architecture, The 6LoWPAN Security aspects in IoT.			
UNIT V CASE STUDY IN IOT			**(06)**
Case Study & advanced IoT Applications: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipments. Use of Big Data and Visualization in IoT, Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi / Intel Galileo/ARM Cortex/ Arduino).			
LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
15	**0**	**15**	**30**

TEXT BOOKS

1. 6LoWPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley
2. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. OvidiuVermesan, Dr. Peter Friess, River Publishers
3. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann