PERIYAR MANIAMMAI
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University)
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think • innovate • transform

Criterion 1 – Curricular Aspects

Key Indicator	1.1	Curriculum Design and Development
Metric	1.1.3	Average percentage of courses having focus on employability/ entrepreneurship/ skilldevelopment offered by Computer Science and Engineering

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SYLLABUS COPY OF THE COURSES HIGHLIGHTING THE FOCUS ON EMPLOYABILITY/ ENTREPRENEURSHIP/ SKILL DEVELOPMENT

1. List of courses for the programmes in order of

S. No.	Programme Name
i.	Bachelor of Engineering – Computer Science and Engineering

2. Syllabus of the courses as per the list.

Legend :   Words highlighted with **Blue Color**   -   Entrepreneurship
Words highlighted with **Red Color**   -   Employability
Words highlighted with **Purple Color**   -   Skill Development

1. List of Courses

Name of the Course	Course Code	Year of introduction	Activities/Content with direct bearing on Employability/ Entrepreneurship/ Skill development
Calculus and Linear Algebra	XMA101	2008-09	Skill Development
Programming for Problem Solving	XCP102	2014-15	Employability
English	XGS103	2014-15	Skill Development
Applied Chemistry for Engineers	XAC104	2008-09	Skill Development
Workshop Practices	XWP105	2014-15	Skill Development
Calculus, Ordinary Differential Equations And Complex Variables	XMA201	2008-09	Skill Development
Environmental Science	XES202	2014-15	Skill Development
Electrical And Electronics Engineering Systems	XBE203	2014-15	Skill Development
Applied Physics for Engineers	XAP204	2008-09	Skill Development
Engineering Graphics	XEG205	2014-15	Skill Development
Probability and Statistics	XPS301	2014-15	Skill Development
Analog& Digital Electronic Circuits	XCS302	2019-20	Employability
Data Structures & Algorithms	XCS303	2013-14	Employability
Object oriented Programming	XCS304	2014-15	Employability
Entrepreneurship Development	XUM305	2013-14	Entrepreneurship
Constitution of India	XUM306	2019-20	Skill Development
In-Plant Training-I	XCS307	2012-13	Skill Development
Discrete Mathematics	XCS401	2008-09	Skill Development
Total Quality Management	XUM402	2013-14	Skill Development
Computer Organization & Architecture	XCS403	2014-15	Employability
Operating Systems	XCS404	2013-14	Employability
Design and Analysis of Algorithms	XUM405	2014-15	Employability
Signals & Systems	XCS501	2013-14	Employability
Formal Language & Automata Theory	XCS502	2013-14	Employability
Database Management Systems	XCS503	2013-14	Employability

Software Engineering	XCS504	2014-15	**Employability**
IT Workshop	XCS505	2019-20	**Employability**
Product Design and Development	XMEOE1	2015-16	*******
Data Communication	XCSE53	2018-19	**Employability**
In-Plant Training – II	XCS508	2012-13	**Skill Development**
Programming with Python	XCS509	2017-18	**Skill Development**
Complier Design	XCS601	2013-14	**Employability**
Computer Networks	XCS602	2014-15	**Employability**
Web and Internet Technology	XCSE61	2015-16	**Employability**
Data Mining	XCSE65	2015-16	**Employability**
Remote Sensing and GIS	XCEOE1	2015-16	*******
Economics for Engineers	XUM606	2016-17	**Skill Development**
Web designing	XCSM02	2015-16	**Skill Development**
Software Engineering (Lab Included)	XCS702	2014-15	**Employability**
Data Analytics (Lab Included)	XCS703	2017-18	**Employability**
Software Testing	XCSE71	2015-16	**Employability**
Artificial Intelligence and Expert System	XCSE76	2015-16	**Employability**
Cyber Security	XUMC706	2015-16	**Employability**
Project phase – I	XCS707	2013-14	**Skill Development**
Career Development Skills(Non Credit Course)	XGS708	2018-19	**Skill Development**
In-Plant Training – III	XCS709	2012-13	**Skill Development**
Digital Image Processing	XCSE81	2018-19	**Employability**
Information Retrieval	XCSE82	2018-19	**Employability**
Project Phase II	XCS804	2013-14	**Skill Development**

2. Syllabus for the Courses

COURSE CODE	XMA101			L	T	P	C
COURSE NAME	**CALCULUS AND LINEAR ALGEBRA**			3	1	0	4
C	P	A		L	T	P	H
3.0	0.5	0.5		3	1	0	4

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

Unit 1: Matrices	12
Linear Transformation - Eigen values and Eigen vectors -Properties of Eigen values and Eigen vectors - Cayley-Hamilton Theorem – Diagonalisation of Matrices – Real Matrices: Symmetric - Skew-Symmetric and Orthogonal Quadratic form – canonical form - Nature of Quadratic form and Transformation of Quadratic form to Canonical form (Orthogonal only).	
Unit 2: Sequences and series	12
Sequences: Definition and examples-Series: Types and convergence- Series of positive terms – Tests of convergence: comparison test, Integral test and D'Alembert's ratio test-. Fourier series: Half range sine and cosine series- Parseval's Theorem.	
Unit 3: Multivariable Calculus: Partial Differentiation	12
Limits and continuity –Partial differentiation – Total Derivative – Partial differentiation of Composite Functions: Change of Variables – Differentiation of an Implicit Function - Euler's Theorem- Jacobian.	
Unit 4: Multivariable Calculus: Maxima and Minima and Vector Calculus	12
Taylor's theorem for function of Two variables- Maxima, Minima of functions of two variables: with and without constraints - Lagrange's Method of Undetermined Multipliers – Directional Derivatives - Gradient, Divergence and Curl.	
Unit 5: Differential and Integral Calculus	12

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

	LECTURE	TUTORIAL	TOTAL
	45	15	60

Text Books:

1. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill New Delhi, 11th Reprint, 2015**. (Unit-1, Unit-3 and Unit-4).**
2. N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2014. **(Unit-2).**
3. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 40th Edition, 2010. **(Unit-5).**

Reference Books:

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

Cos Versus GA mapping
Table 1: Mapping of Cos with GAs:

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

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

CO 5	3	2	1	1	2	1	0	0	0	0	0	1	1	1
Total	15	10	5	5	10	5	0	0	0	0	0	5	5	5
Scaled Value	3	2	1	1	2	1	0	0	0	0	0	1	1	1

1-5 ➝ 1 , 6-10 ➝ 2 , 11-15 ➝ 3

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

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

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

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

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

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

TEXT BOOKS /REFERENCE BOOKS

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

Table 1: COs Versus POs Mapping

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

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

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

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

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

UNIT I - **Vocabulary Building**	9

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

UNIT II - **Basic Writing Skills**	9

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

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

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

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

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

UNIT V - **Writing Practices**	9

5.1 Comprehension
5.2 Précis Writing
5.3 Essay Writing

Unit VI - Oral Communication
(This unit involves interactive practice sessions in Language Lab)
☐ Listening Comprehension
☐ Pronunciation, Intonation, Stress and Rhythm
☐ Common Everyday Situations: Conversations and Dialogues
☐ Communication at Workplace
☐ Interviews
☐ Formal Presentations

Suggested Readings:

(i) Practical English Usage. Michael Swan. OUP. 1995
(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007
(iii) On Writing Well. William Zinsser. Harper Resource Book. 2001
(iv) Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006
(v) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011
(vi) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

Table 1: Mapping of Cos with POs:

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

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

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

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

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

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

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

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

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

Schrodinger equation. Particle in a box solution and their applications for conjugated molecules and nanoparticles.. Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic molecules. Crystal

field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

Intermolecular forces and potential energy surfaces

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

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

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

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

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

Organic reactions and synthesis of a drug molecule

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

	LECTURE	TUTORIAL	PRACTICAL	TOTAL HOURS
Hours	45	15	30	90

TEXT BOOKS

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

REFERENCE BOOKS

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

E Resources - MOOCs:

1. http://www.mooc-list.com/course/chemistry-minor-saylororg
2. https://www.canvas.net/courses/exploring-chemistry
3. http://freevideolectures.com/Course/2263/Engineering-Chemistry-I

4. http://freevideolectures.com/Course/3001/Chemistry-I
5. http://freevideolectures.com/Course/3167/Chemistry-II
6. http://ocw.mit.edu/courses/chemistry/

Laboratory Part	30 hrs

Experiments :

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

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

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

	LECTURE	TUTORIAL	PRACTICAL	TOTAL HOURS
HOURS	45	15	30	90

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

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

$1 - 5 \rightarrow 1, 6 - 10 \rightarrow 2, 11 - 15 \rightarrow 3$
1- Low Relation, 2-Medium Relation, 3-High Relation

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

PREREQUISITE:

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

COURSE CONTENT

EXP.NO	TITLE	CO RELATION
1	INTRODUCTION TO MACHINING PROCESS	**CO1**
2	PLAIN TURINING USING LATHE OPERATION	**CO1**
3	INTRODUCTION TO CNC	**CO1**
4	DEMONSTRATION OF PLAIN TURNING USING CNC	**CO1**
5	STUDY OF METAL CASTING OPERATION	**CO2**
6	DEMONSTRATION OF MOULDING PROCESS	**CO2**
7	STUDY OF SMITHY OPERATION	**CO2**
8	STUDY OF CARPENTRY TOOLS	**CO3**
9	HALF LAP JOINT – CARPENTRY	**CO3**
10	MORTISE AND TENON JOINT – CARPENTRY	**CO3**
11	STUDY OF FITTING TOOLS	**CO3**
12	SQUARE FITTING	**CO3**
13	TRIANGULAR FITTING	**CO3**
14	STUDY OF WELDING TOOLS	**CO4**
15	SQUARE BUTT JOINT - WELDING	**CO4**
16	TEE JOINT – WELDING	**CO4**
17	INTRODUCTION TO HOUSE WIRING	**CO5**

18	ONE LAMP CONTROLLED BY ONE SWITCH	**CO5**
19	TWO LAMPS CONTROLLED BY SINGLE SWITCH	**CO5**
20	STAIRCASE WIRING	**CO5**

TEXT BOOKS

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay

2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.

REFERENCES

1. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd.

2. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd.,New Delhi

3. Workshop Technology by B.S. Raghuwanshi, DhanpatRai and Co., New Delhi.

4. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi.

E RESOURCES
1. http://nptel.ac.in/courses/112107145/

Mapping of CO's with PO'S:

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

$1 - 5 \rightarrow 1$,　　　　$6 - 10 \rightarrow 2$,　　　　$11 - 15 \rightarrow 3$
1 - Low Relation, 2- Medium Relation, 3- High Relation

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

PREREQUISITE: Mathematics I (Calculus and Linear Algebra)

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

Unit -I MULTIVARIABLE CALCULUS (INTEGRATION)	12

Multiple Integration: Double integrals (Cartesian) - change of order of integration in double integrals - Change of variables (Cartesian to polar) - Triple integrals (Cartesian), Scalar line integrals - vector line integrals - scalar surface integrals - vector surface integrals - Theorems of Green, Gauss and Stokes.

Unit –II FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS	12

Exact - linear and Bernoulli's equations - Euler's equations - Equations not of first degree: equations solvable for p - equations solvable for y- equations solvable for x and Clairaut's type.

Unit - III ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDERS	12

Second order linear differential equations with variable coefficients- method of variation of parameters - Cauchy-Euler equation- Power series solutions- Legendre polynomials- Bessel functions of the first kind and their properties.

Unit -IV COMPLEX VARIABLE – DIFFERENTIATION	12

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

Unit - V **COMPLEX VARIABLE – INTEGRATION**			**12**

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

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

Text Book:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 40th[th] Edition, 2008.

Reference Books:

1. G.B. Thomas and R.L. Finney, "Calculus and Analytic geometry", 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, "Elementary Differential Equations and Boundary Value Problems", 9[th]Edn. Wiley India, 2009.
4. S. L. Ross, "Differential Equations", 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, "An Introduction to Ordinary Differential Equations", Prentice Hall India, 1995.
6. E. L. Ince, "Ordinary Differential Equations", Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, "Complex Variables and Applications", 7th Ed., McGraw Hill, 2004.
8. N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2008.

Cos Versus GA mapping
Table 1: Mapping of Cos with GAs:

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

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

1-6 ➝ 1 , 6-10 ➝ 2 , 11-15 ➝ 3

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

COURSE CODE	XUM202		L	T	P	C
COURSE NAME	ENVIRONMENTAL SCIENCE		3	0	0	0
C	P	A		L	T	P	H
2.5	0.0	0.5		3	0	0	3

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

UNIT - I INTRODUCTION TO ENVIRONMENTAL STUDIES AND ENERGY	12

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

UNIT – II ECOSYSTEMS AND BIODIVERSITY	7

Concept of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III ENVIRONMENTAL POLLUTION	10

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Solid

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

UNIT –IV SOCIAL ISSUES AND THE ENVIRONMENT	10

Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Wasteland reclamation – Consumerism and waste products – Environment Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT –V HUMAN POPULATION AND THE ENVIRONMENT	6

Population growth, variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education - HIV / AIDS – Women and Child welfare programme– Role of Information Technology in Environment and human health – Case studies.

	LECTURE	TUTORIAL	TOTAL
	45	0	45

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

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

E RESOURCES
1. http://www.e-booksdirectory.com/details.php?ebook=10526
2. https://www.free-ebooks.net/ebook/Introduction-to-Environmental-Science

COURSE CODE	XBE203	L	T	P	C

3. https://www.free-ebooks.net/ebook/What-is-Biodiversity

4. https://www.learner.org/courses/envsci/unit/unit_vis.php?unit=4

5. http://bookboon.com/en/pollution-prevention-and-control-ebook

6. http://www.e-booksdirectory.com/details.php?ebook=8557

7. http://www.e-booksdirectory.com/details.php?ebook=6804

8. http://bookboon.com/en/atmospheric-pollution-ebook

9. http://www.e-booksdirectory.com/details.php?ebook=3749

10. http://www.e-booksdirectory.com/details.php?ebook=2604

11. http://www.e-booksdirectory.com/details.php?ebook=2116

12. http://www.e-booksdirectory.com/details.php?ebook=1026

13. http://www.faadooengineers.com/threads/7894-Environmental-Science

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

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

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

	PO												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
CO1	3	0	0	0	0	0	2	3	3	0	0	0	0	0
CO2	2	0	0	0	0	0	1	2	2	0	0	0	0	0
CO3	3	0	0	0	0	0	2	3	3	0	0	0	0	0
CO4	3	0	0	0	0	0	3	3	3	0	0	0	0	0
CO5	3	0	0	0	0	0	2	2	3	0	0	0	0	0
	14	0	0	0	0	0	10	13	14	0	0	0	0	0
	3	0	0	0	0	0	2	3	3	0	0	0	0	0

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

COURSE NAME	ELECTRICAL AND ELECTRONICS ENGINEERING SYSTEMS	3	1	1	5
C	P	A		L	T	P	H

C	P	A		L	T	P	H
3.0	1.0	0.0		3	1	2	6

PREREQUISITES : PHYSICS

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

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

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

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

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

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

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

UNIT IV – **DIGITAL ELECTRONICS**	9 + 3+10

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

UNIT V – **MICROPROCESSORS**	9+ 3+0

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

LIST OF EXPERIMENTS :

1.	Study of Electrical Symbols, Tools and Safety Precautions, Power Supplies.			
2.	Study of Active and Passive elements – Resistors, Inductors and Capacitors, Bread Board.			
3.	Verification of AC Voltage, Current and Power in Series and Parallel connection.			
4.	Testing of DC Voltage and Current in series and parallel resistors which are connected in breadboard by using Voltmeter, Ammeter and Multimeter.			
5.	Fluorescent lamp connection with choke.			
6.	Staircase Wiring.			
7.	Forward and Reverse bias characteristics of PN junction diode.			
8.	Forward and Reverse bias characteristics of zener diode.			
9.	Input and Output Characteristics of NPN transistor.			
10.	Construction and verification of simple Logic Gates.			
11.	Construction and verification of adders.			
12.	Construction and verification of subtractor.			
	LECTURE	**TUTORIAL**	**PRACTICAL**	**TOTAL**
	45	**15**	**30**	**90**

TEXT BOOKS

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

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

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

Table: 1 Mapping of COs with POs:

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

1-5 → 1, 6-10 → 2, 11-15 → 3

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

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

PREREQUISITE: Basic Physics in HSC level

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

UNIT - I MECHANICS OF SOLIDS	9+3+9

Mechanics: Force - Newton's laws of motion - work and energy - impulse and momentum - torque - law of conservation of energy and momentum - Friction.
Elasticity: Stress - Strain - Hooke's law - Stress strain diagram - Classification of elastic modulus - Moment, couple and torque - Torsion pendulum - Applications of torsion pendulum - Bending of beams - Experimental determination of Young's modulus: Uniform bending and non-uniform bending.

UNIT -II ELECTROMAGNETIC THEORY	9+3+3

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

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

Optics: Dispersion- Optical instrument: Spectrometer - Determination of refractive index and dispersive power of a prism- Interference of light in thin films: air wedge - Diffraction: grating.
LASER: Introduction - Population inversion -Pumping - Laser action - Nd-YAG laser - CO_2 laser -

Applications

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

UNIT –IV SEMICONDUCTOR PHYSICS	9+3+6

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

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

UNIT –V QUANTUM PHYSICS	9+3+0

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

TEXT BOOKS

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

REFERENCE BOOKS

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

E RESOURCES

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

LABORATORY

1.	Torsional Pendulum - determination of moment of inertia and rigidity modulus of the given material of the wire.
2.	Uniform Bending - Determination of the Young's Modulus of the material of the beam.
3.	Non-Uniform Bending - Determination of the Young's Modulus of the material of the beam.
4.	Meter Bridge - Determination of specific resistance of the material of the wire.
5.	Spectrometer - Determination of dispersive power of the give prism.
6.	Spectrometer - Determination of wavelength of various colours in Hg source using grating.
7.	Air wedge - Determination of thickness of a given thin wire.
8.	Laser - Determination of wavelength of given laser source and size of the given micro particle using Laser grating.

9.	Post office Box - Determination of band gap of a given semiconductor.
10.	PN Junction Diode - Determination of V-I characteristics of the given diode.

REFERENCE BOOKS

1. Samir Kumar Ghosh, "A text book of Advanced Practical Physics", New Central Agency (P) Ltd, 2008.

2. Arora C.L., "Practical Physics", S. Chand & Company Ltd., New Delhi, 2013.

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

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

Table 1: Mapping of CO's with PO:

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

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

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

PREREQUISITE: NIL

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

UNIT-I INTRODUCTION, FREE HAND SKETCHING OF ENGG OBJECTS AND CONSTRUCTION OF PLANE CURVE	6+6
Importance of graphics in engineering applications – use of drafting instruments – BIS specifications and conventions as per SP 46-2003. Pictorial representation of engineering objects – representation of three dimensional objects in two dimensional media – need for multiple views – developing visualization skills through free hand sketching of three dimensional objects. Polygons & curves used in engineering practice – methods of construction – construction of ellipse, parabola and hyperbola by eccentricity method – cycloidal and involute curves – construction – drawing of tangents to the above curves.	

UNIT –II PROJECTION OF POINTS, LINES AND PLANE SURFACES	6+6
General principles of orthographic projection – first angle projection – layout of views – projections of points, straight lines located in the first quadrant – determination of true lengths of lines and their inclinations to the planes of projection – traces – projection of polygonal surfaces and circular lamina inclined to both the planes of projection.	

UNIT-III PROJECTION OF SOLIDS AND SECTIONS OF SOLIDS	6+6
Projection of simple solids like prism, pyramid, cylinder and cone when the axis is inclined to one plane of projection – change of position & auxiliary projection methods – sectioning of above solids in simple vertical positions by cutting plane inclined to one reference plane and perpendicular to the other and above solids in inclined position with cutting planes parallel to one reference plane – true shapes of sections.	

UNIT - IV DEVELOPMENT OF SURFACES AND INTERSECTION OF SOLIDS	**6+6**

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

UNIT - V ISOMETRIC AND PERSPECTIVE PROJECTIONS	**6+6**

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

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

TEXT BOOKS

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

REFERENCES

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

E RESOURCES

1. http://periyarnet/Econtent

2. http://nptel.ac.in/courses/112103019/

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

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

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

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

PREREQUISITE:CALCULUS AND LINEAR ALGEBRA

COURSE OUTCOMES:

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

UNIT I: BASIC PROBABILITY	10

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

UNIT II: CONTINUOUS PROBABILITY DISTRIBUTIONS	10

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

UNIT III: BIVARIATE DISTRIBUTIONS	10

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

UNIT IV: BASIC STATISTICS	10

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, normal and Poisson - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

UNIT V: APPLIED STATISTICS	10

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

UNIT VI: SMALL SAMPLES   **10**

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

	LECTURE	TUTORIAL	TOTAL
	45	15	60

Textbooks/References

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

Cos Versus GA mapping
Table 1: Mapping of Cos with GAs:

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

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

CO 5	3	2	1	1	2	1	0	0	0	0	0	1	1	1
Total	15	10	5	5	10	5	0	0	0	0	0	5	5	5
Scaled Value	3	2	1	1	2	1	0	0	0	0	0	1	1	1

$1 - 5 \rightarrow 1,$ $\qquad 6 - 10 \rightarrow 2,$ $\qquad 11 - 15 \rightarrow 3$
1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE	XCS302			L	T	P	C
COURSE NAME	ANALOG AND DIGITAL ELECTRONIC CIRCUITS			3	0	2	5
C	P	A		L	T	P	H
3.0	1.0	1.0		3	0	4	7

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

COURSE CONTENT		Hours
UNIT I	**SEMICONDUCTOR DEVICES AND CIRCUITS**	**9 + 12**
	Basics and characteristics – p-n junction diode, Zener diode, BJT and MOSFET –applications, rectifier, clipper, clamper and amplifier circuits. Differential amplifier and Direct coupled Multistage amplifier. **List of Experiments:** 1. Design and implementation of rectifiers, clipper and Clamper Circuits 2. Design and implementation of amplifier circuits.	
UNIT II	**LINEAR AND NON LINEAR APPLICATIONS OF OP-AMP**	**9 + 12**
	Introduction to op-amp-Linear applications; Inverting and non-inverting amplifier, differential amplifier, Integrator, active filter, voltage regulator, We in bridge and Phase shift oscillators Nonlinear applications; Comparator, Zero crossing Detector, wave and triangular wave generators. **List of Experiments** 3. Design and implementation of Op-amp linear applications. 4. Design and implementation of Op-amp non-linear applications	
UNIT III	**FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES**	**9 + 12**
	Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive –OR operations, Boolean algebra, examples of IC gates. Number Systems – binary, signed binary, octal and hexadecimal number-arithmetic	

	calculation-digital logic families; TTL, Schottky TTL and CMOS logic. A/D and D/A converter. List of Experiments: 5. Verification of Boolean theorems using digital logic gates.		
UNIT IV	**COMBINATIONAL DIGITAL CIRCUITS**		**9 + 12**
	Standard representation for logic function, K-map representation, Multiplexer, Demultiplexer, Adders, Subtractors, Digital comparator and code converters. List of Experiments: 6. Design and implementation of combinational circuits using basic gates for code converters. 7. Design and implementation of binary adder / subtractor using basic gates. 8. Design and implementation of Multiplexers/Demultiplexers.		
UNIT V	**SEQUENTIAL DIGITAL CIRCUITS,MEMORIES AND PLD**		**9 + 12**
	Sequential digital circuits; Flipflops-SR, J-K, T and D flip flops-Shift Register types and applications-Counters types and applications. Memory organization and operation, expanding memory size, classification and characteristics of memories, read only memory, random access memory, addressable memory, PLD (Programmable Logic Device). Memory and List of Experiments: 9. Design and implementation of Shift registers. 10. Design and implementation of counters.		

		LECTURE	PRACTICAL	TOTAL	
		45	60	105	

TEXT BOOKS / REFERENCE BOOKS

1. R.L.Boylestad, L. Nashelsky, Electronic devices, and circuit theory, Prentice Hall, 2002

2. A.S.Sedra and K.C.Smith,"MicroelectronicCircuits",New York, Oxford University Press, 7th edition

3. R.P.Jain,"Modern Digital Electronics", McGraw Hill Education,2009

4. M.M. Mano,"Digital logic and Computer design",Pearson Education India,2016.

5. A.Kumar 'Fundamentals of Digital circuits",Prentice hall India,2016.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

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

COURSE CODE	XCS303			L	T	P	C
COURSE NAME	DATA STRUCTURE AND ALGORITHMS			3	0	2	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	4	7

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

COURSE CONTENT		Hours
UNIT I	LINEAR DATA STRUCTURE	9 + 18
	Theory ADT – List ADT – Stack ADT – Queue ADT. **Practical** 1. Singly Linked List 2. Doubly linked List 3. Circular Linked List 4. Stack Using Array implementation 5. Queue Using Array Implementation 6. Program for Balancing symbol 7. Program for Postfix expression evaluation	
UNIT II	NON LINEAR DATA STRUCTURE	9 + 14
	Theory Trees – Binary Trees – Binary Search Trees – AVL Trees – Splay Trees – Tree Traversal – B Trees- B+ Tree **Practical** 8. Binary Search Tree	

UNIT III	**SORTING**	12 + 14

	Theory
	Insertion sort – Shell sort – Heap sort – Merge sort – Quick sort – Bucket sort – External Sorting
	Practical
	   9. Insertion Sort
	  10. Heap Sort
	  11. Merge Sort
	  12. Quick Sort	

UNIT IV	**GRAPH ALGORITHMS**	12 + 14
	Theory Topological sort – Shortest path algorithms – Network Flow problems – Minimum Spanning Tree – Applications of Depth First search – NP completeness. **Practical** 13. Dijkstra's Algorithm	
UNIT V	**ALGORITHM DESIGN TECHNIQUES**	12
	Theory Greedy Algorithms – Divide and Conquer – Dynamic Programming - Randomized Algorithms – Backtracking algorithms	

LECTURE	TUTORIAL	PRACTICAL	TOTAL	
45	**0**	**60**	**105**	

TEXT BOOKS /REFERENCE BOOKS

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

2. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002

3. ReemaThareja, "Data Structures Using C", Oxford University Press, 2011

4. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company

5. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

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

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

COURSE CODE	XCS304			L	T	P	C
COURSE NAME	**OBJECT ORIENTED PROGRAMMING**			2	0	2	4
C	P	A		L	T	P	H
3.0	0.5	0.5		2	0	4	6

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

COURSE CONTENT	Hours
UNIT- I PROGRAMMING IN C++	**6 + 12**
C++ fundamentals, Classes and objects, Abstract data types,ADT implementation-Concrete state space- concrete invariant- abstraction function. Implementing operationsConstructors 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++	**6 + 12**
C++ streams – console streams – console stream classes-formatted and unformatted console I/O operations, manipulators - File streams - classes file modes file pointers and manipulations file I/O – Exception handling. **List of Experiments:**	

3. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor, and overloading of assignment operator. 4. Overload the new and delete operators to provide custom dynamic allocation of memory.	
UNIT - III JAVA INTRODUCTION &DESIGN PATTERNS	**6 + 12**

Design patterns. Introduction and classification. The iterator pattern. - Model-view-controller pattern. Introduction to java, data types, variables and arrays, operators, control statements, classes, objects, methods, Memory management.
 	
List of Experiments:
5. Simple Java applications
       - For understanding reference to an instance of a class (object), methods
       - Handling Strings in Java
       - Constructor in Java	

UNIT- IV JAVA INTRODUCTION & PROGRAMMING	**6 + 12**

Inheritance Packages and Interfaces, Exception handling Strings, Input /Output, Multithreading – interrupting threads – thread states – thread priorities – thread synchronization – Executors.
List of Experiments:
6. Simple Package creation.
    - Developing user defined packages in Java
7. Interfaces
    - Developing user-defined interfaces and implementation
    - Use of predefined interfaces
8. Exception Handling Mechanism in Java
    - Handling pre-defined exceptions	

UNIT V FILE HANDLING IN JAVA	
Files - streams - byte streams, character streams, text input/output, binary input/output, random access file operations, File management using File class. Connecting to a database using JDBC **List of Experiments:** 9. Program to implement streaming models 10. Program to implement JDBC Connectivity 11. Create a GUI interface program using scala.	**6 + 12**

		LECTURE	**PRACTICAL**	**TOTAL**	
		30	**60**	**90**	

TEXT BOOKS /REFERENCE BOOKS

1. K.R.Venugopal, RajkumarBuyya, T.Ravishankar, "Mastering C++", TMH, 2003

2. BjarneStroustrup, "The C++ programming language", Addison Wesley, 2000

3. HerbetSchidt and Dale Srien, "Java Fundamentals - A comprehensive Introduction", TMH.

4. Herbert Schildt, "The Complete Reference (Fully updated for jdk7)", Oracle press 8th Edition, 2012

5. Barbara Liskov, Program Development in Java, Addison-Wesley, 2001

6. Java for Programmers, P.J. Deitel and H.M. Deitel, Pearson education

7. Java: How to Program P.J. Deitel and H.M. Deitel, PHI.

8. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.

9. Thinking in Java, Bruce Eckel, Pearson Education

10. Ira Pohl, "Object oriented programming using C++", Pearson Education Asia, 2003

11. John R.Hubbard, "Programming with C++", Schaums outline series, TMH, 2003

12. E.Balagurusamy " Object Oriented Programming with C++", TMH 2/e

13. Cay S.Horstmann and Gary Cornel, "Core Java Programming Volume – I", 9th Edition, 2012.

14. Programming in Java, Bruce Eckel, Pearson Education

15. Programming in Java, S. Malhotra and S. Choudhary, Oxford Univ. Press.

16. Deitel&Deitel, "Java How to Program", Prentice Hall, 9th Edition, 2012

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

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

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

COURSE CODE	XES306			L	T	P	C
COURSE NAME	ENTREPRENEURSHIP DEVELOPMENT			2	0	0	2
C	P	A		L	T	P	H
1.2	0.0	0.8		2	0	0	2

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

UNIT IENTREPRENEURIAL TRAITS AND FUNCTIONS	6
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 -IINEW PRODUCT DEVELOPMENT AND VENTURE CREATION	6
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 –IIIENTREPRENEURIAL FINANCE	6
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 –IVLAUNCHING OF SMALL BUSINESS AND ITS MANGEMENT	6
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	6
Technology management; Impact of technology on society and business; Role of Government in supporting Technology Development and IPR protection; Entrepreneurship Development Training and Other Support Services.	

	LECTURE	TUTORIAL	TOTAL
	30	0	30

TEXT BOOKS

- Hisrich, 2016, *Entrepreneurship*, Tata McGraw Hill, New Delhi.

- S.S.Khanka, 2013, *Entrepreneurial Development*, S.Chand and Company Limited, New Delhi.

REFERENCE BOOKS

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

WEB SITES AND WEB RESOURCES:

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

TABLE :1 MAPPING COURSE OUTCOME WITH GRADUATE ATTRIBUTES:

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

Total	0	0	1	2	3	5	3	8	10	8	9	9
Scaled Value			1	1	1	2	1	2	3	2	2	2

$1 - 5 \rightarrow 1$, $6 - 10 \rightarrow 2$, $11 - 15 \rightarrow 3$
1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCI307			L	T	P	C
COURSE NAME	CONSTITUTION OF INDIA			3	0	0	3
C	P	A		L	T	P	H
2.0	0.0	1.0		3	0	0	3

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

UNIT I	8

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

UNIT II	9

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

UNIT III	10

Union Legislature- Structure and Functions of LokSabha- Structure and Functions of RajyaSabha-Legislative Procedure in India- Important Committes of LokSabha- Speaker of the LokSabha.

UNIT IV	9

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

UNIT V	9

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

LECTURE	TUTORIAL	PRACTICAL	TOTAL
45	0	0	45

REFERENCES

1. W.H.Morris Shores- Government and politics of India, NewDelhi,B.1.Publishers,1974.

2. M.V.Pylee- Constitutional Government in India, Bombay, Asia Publishing House, 1977.

3. R.Thanker- The Government and politics of India, London:Macmillon, 1995.

4. A.C.Kapur- Select Constitutions S,Chand& Co.,NewDelhi, 1995

5. V.D.Mahajan- Select Modern Governments,S,Chand&Co, NewDelhi,1995.

6. B.C.Rout- Democractic Constitution of India.

7. GopalK.Puri- Constitution of India, India 2005.

Table 1: Mapping of COs with POs

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

1-5 →1, 6-10 →2, 11-15 →3

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

COURSE CODE	XPS401			L	T	P	C
COURSE NAME	DISCRETE MATHEMATICS			3	1	0	4
C	P	A		L	T	P	H
4	0	0		3	1	0	4

PREREQUISITE:CALCULUS AND LINEAR ALGEBRA

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

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

Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.
Principles of Mathematical Induction:
The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT II:	**12**

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

UNIT III: PROPOSITIONAL LOGIC	**12**

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

UNIT IV: ALGEBRAIC STRUCTURES AND MORPHISM	**12**

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

UNIT V: GRAPHS AND TREES	12

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

	LECTURE	TUTORIAL	TOTAL
	45	15	60

SUGGESTED BOOKS:

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

SUGGESTED REFERENCE BOOKS:

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

Cos Versus GA mapping
Table 1: Mapping of Cos with GAs:

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

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

CO 3	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 4	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 5	3	2	1	1	2	1	0	0	0	0	0	1	1	1
Total	15	10	5	5	10	5	0	0	0	0	0	5	5	5
Scaled Value	3	2	1	1	2	1	0	0	0	0	0	1	1	1

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

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

COURSE CODE	XCS402			L	T	P	C
COURSE NAME	COMPUTER ARCHITECTURE AND ORGANIZATION			3	0	2	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	4	5

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

COURSE CONTENT	Hours
UNIT I BASIC STRUCTURE OF COMPUTERS	9+9
Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues- Measuring, Reporting and Summarizing Performance – Quantitative principles of computer design **Practical:** 1. String Manipulations, Sorting And Searching- Ascending & Descending Largest & Smallest.	
UNIT II ARITHMETIC UNIT	9+6
Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations. **Practical:** 3.16 Bit Arithmetic Operation a. Addition b. Subtraction c. Multiplication d. Division 4. Logical Operations.	
UNIT III BASIC PROCESSING UNIT	9
Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control. Pipelining –	

		LECTURE	PRACTICAL	TOTAL	

	Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar operation.	
UNIT IV MEMORY SYSTEM		**9+9**
	Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage. **Practical:** Simulate the mapping techniques of Cache memory 5. Direct Mapped cache 6. Associative Mapped cache 7. Set Associative Mapped cache.	
UNIT V I/O ORGANIZATION		**9+6**
	Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB). **Practical:** 8. Traffic light control 9. Stepper motor control 10.Key board and Display	

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

TEXT BOOKS /REFERENCE BOOKS

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

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

$1 - 5 \rightarrow 1,$ $6 - 10 \rightarrow 2,$ $11 - 15 \rightarrow 3$
 0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE	XCS403			L	T	P	C
COURSE NAME	OPERATING SYSTEMS			3	0	2	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	4	5

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

COURSE CONTENT	Hours
UNIT I OPERATING SYSTEMS OVERVIEW	**9 + 6**
Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System. **Practical** 1. Basic Commands in Linux 2. Write programs using the process related system calls of UNIX operating system like fork, exec, exit, wait, getuid, geteuid, close, kill etc... 3. Write C programs to simulate UNIX commands like ls, grep, etc…	
UNIT II PROCESS MANAGEMENT	**9+6**
Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads **Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor **Scheduling:** Real Time scheduling: RM and EDF. **Practical**	

4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)

5. Implement the various scheduling algorithms like FCFS and SJF scheduling, Priority and Round robin scheduling.

UNIT III INTER-PROCESS COMMUNICATION	9+6

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson' Solution, The Producer\Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc.

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Practical
6. Simulate Inter Process Communication
7. Implement the semaphores like Producer – Consumer problem
8. Implementation of Banker's Algorithm

UNIT IV MEMORY MANAGEMENT	9+6

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction; Paging: Principle of Operation – Page allocation– Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory– Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not Recently used (NRU) and Least Recently used (LRU).

Practical
9. Implementation of Memory Management Scheme- Paging
   a. Implementation of Best Fit algorithm
   b. Implementation of First Fit Algorithm
   c. Implement the contiguous file allocation technique
   d. Implementation of FIFO Page Replacement Algorithm
   e. Implementation of LRU Page Replacement Algorithm

UNIT V I/O SYSTEMS	9+6

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods

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

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

a

TEXT BOOKS /REFERENCE BOOKS

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

2. William Stallings, "Operating Systems – Internals and Design Principles", 7[th]Edition, Prentice Hall, 2011

3. Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education, 1996.

4. Gary J. Nutt ,"Operating Systems: A Modern Perspective", 2nd Edition, Addison-Wesley,2000

5. Maurice Bach ,"Design of the Unix Operating Systems", 8th Edition, Prentice-Hall of India,2012

6. Daniel P. Bovet, Marco Cesati, "Understanding the Linux Kernel", 3rd Edition, , O'Reilly and Associates,2005

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

$1 - 5 \rightarrow 1$, $6 - 10 \rightarrow 2$, $11 - 15 \rightarrow 3$
1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE	XCS404			L	T	P	C
COURSE NAME	DESIGN AND ANALYSIS OF ALGORITHMS			3	0	2	5

C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	4	5

Course Outcome

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

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

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

Problems - Randomized algorithms - Class of problems beyond NP – P SPACE.

List of Experiments:

13.Implement travelling salesman problem using the dynamic programming approach.

14.Implement the Hamiltonian Cycle using the dynamic programming approach.

		LECTURE	TUTORIAL	PRACTICAL	TOTAL	
		45	-	30	75	

TEXT BOOKS /REFERENCE BOOKS

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

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

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

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

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

Course outcome

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

COURSE CONTENT	Hours
UNIT I INTRODUCTION	**9**
Definition of quality – Dimensions of quality – Quality planning – Quality costs – Analysis techniques for quality costs – Basic concepts of Total Quality Management – Historical review –Principles of TQM – Leadership – Concepts – Role of senior management – Quality Council –Quality statements – Strategic planning – Deming philosophy – Barriers to TQM implementation	
UNIT II TQM PRINCIPLES	**9**
Customer satisfaction – Customer perception of quality – Customer complaints – Service quality –Customer retention – Employee involvement – Motivation, empowerment, teams, recognition and reward – Performance appraisal – Benefits – Continuous process improvement – Juran trilogy – PDSA cycle – 5S – Kaizen – Supplier partnership – Partnering – Sourcing – Supplier selection – Supplier rating – Relationship development – Performance measures – Basic concepts – Strategy – Performance measure.	
UNIT III STATISTICAL PROCESS CONTROL (SPC)	**9**
The seven tools of quality – Statistical fundamentals – Measures of central tendency and dispersion – Population and sample – Normal curve – Control charts for variables and attributes – Process capability – Concept of six sigma	

	– New seven management tools.			
UNIT IV	**TQM TOOLS**			**9**
	Benchmarking – Reasons to benchmark – Benchmarking process – Quality Function Deployment (QFD) – House of quality – QFD process – Benefits – Taguchi quality loss function – Total Productive Maintenance (TPM) – Concept – Improvement needs – FMEA – Stages of FMEA.			
UNIT V	**QUALITY SYSTEMS**			**9**
	Need for ISO 9000 and other quality systems – ISO 9000:2000 quality system – Elements –Implementation of quality system – Documentation – Quality auditing – TS 16949 – ISO 14000 –Concept, requirements and benefits.			

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

TEXT BOOKS

1.Dale H. Besterfiled, et. Al. "Total Quality Management", New Delhi, Pearson Education, Inc.. 2007.

2.James R. Evans and William M. Lidsay, "The Management and Control of Quality", 5th Edition, South- Western, 2002.

REFERENCES

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

E- REFERENCES

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

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

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

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

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

COURSE CODE	XCS501		L	T	P	C
COURSE NAME	**SIGNALS AND SYSTEMS**		3	0	0	3
C:P:A	3:0:0		L	T	P	H
			3	0	0	3

PREREQUISITES

COURSE OUTCOMES			Domain	Level
CO1	*Describe* and **classify** the signals & systems		Cognitive	Remembering Understanding
CO2	*Find* and ***analyze*** the properties of continuous time signal using Fourier and Laplace Transform,		Cognitive	Remembering, Analyzing
CO3	*Find* and solve the continuous time LTI system performance ofFourier and Laplace Transform.		Cognitive	Remembering, Applying
CO4	*Find ,apply*and*analyze* the properties of discrete time signal using Fourier and Z Transform.		Cognitive	Remembering, Applying Analyzing,
CO5	*Explain,Solve*and*determine*the performance of Discrete Time LTI system in Fourier and Z Transform.		Cognitive	Understanding Applying, Evaluating

UNIT I - CLASSIFICATION OF SIGNALS AND SYSTEMS	9

Continuous time signals (CT signals) - Discrete time signals (DT signals) - Step, Ramp, Pulse,Impulse, Sinusoidal, Exponential, Classification of CT and DT signals - Periodic & Aperiodic signals, Deterministic& Random signals, Energy & Power signals - CT systems and DT systems Classification of systems – Static & Dynamic, Linear & Nonlinear, Time-variant &Time-invariant,Causal&Noncausal, Stable & Unstable.

UNIT II - ANALYSIS OF CONTINUOUS TIME SIGNAL	9

Fourier series analysis-spectrum of Continuous Time (CT) signals- Fourier and Laplace Transforms in CT Signal Analysis - Properties.

UNIT III - LINEAR TIME INVARIANT- CONTINUOUS TIME SYSTEMS	9

Differential Equation-Block diagram representation-impulse response, convolution integrals-Fourier and Laplace transforms in Analysis of CT systems.

UNIT IV - ANALYSIS OF DISCRETE TIME SIGNALS	9

Baseband Sampling of CT signals- Aliasing, Reconstruction of CT signal from DT signals DTFT and properties, Z-transform & properties.

UNIT V - LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS	9

Difference Equations-Block diagram representation-Impulse response - Convolution sum-Discrete Fourier and Z Transform Analysis of Recursive & Non-Recursive systems.

	LECTURE	TUTORIAL	PRACTICAL	TOTAL
HOURS	45	0	0	45

TEXT BOOKS

1. P.RamakrishnaRao, "Signals and Systems", Tata McGraw Hill Publications, 2008.
2. B.P.Lathi, "Principles of Linear Systems and Signals", 2nd Edition, Oxford University Press, 2009.

REFERENCES

1. R.EZeimer, W.H.Tranter. and .R.D.Fannin, "Signals & Systems - Continuous and Discrete",

Pearson Education, 2009.

1. John Alan Stuller, "An Introduction to Signals and Systems", Thomson Learning , 2007.
2. M.J .Roberts, "Signals & Systems Analysis using Transform Methods & MATLAB", Tata McGraw Hill, 2007.
3. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson Education, Indian Reprint, 2007.

E-REFERENCES

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

COURSE CODE	XCS502			L	T	P	C
COURSE NAME	FORMAL LANGUAGE & AUTOMATA THOERY			2	1	0	3
C:P:A = 3:0:0							
C	P	A		L	T	P	H
3.0	0.0	0.0		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. SomenathBiswas, Computer Science and Engineering, IIT Kanpur

Mapping of COs with POs:

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	2	3	0	0	0	1	1	1	0	0	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	PO1 2	PSO 1	PSO 2
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	XCS503		L	T	P	C
COURSE NAME	DATABASE MANAGEMENT SYSTEMS		3	0	2	5

C	P	A		L	T	P	H
2.8	0.8	0.0		3	0	3	5

Learning Objectives:

This course aims at

- facilitating the student to understand the various concepts and functionalities of Database Management Systems, the method and model to store data.
- How to manipulate through query languages, the effective designing of relational database .
- How the system manages the concurrent usage of data in multi user environment.

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	***Construct*** queries with relational database system with the basics of SQL	Cognitive Psychomotor	Remember, Create Guided Response
CO2	***Relate and Apply*** the design principles for logical design of databases, including ER model and normalization approach	Cognitive Psychomotor	Understand, Apply Guided Response
CO3	***Define and Explain*** the basic database storage structures and access techniques: file and page organizations, indexing methods including B-tree, B+ tree and hashing.	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 Psychomotor	Understand, Apply Guided Response

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 dependencies 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:
9. Develop the following applications
   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 McGraw Hill, 2011.

REFERENCES
1. RamezElmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education, 2008.

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

Mapping of COs with POs:

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

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	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	XCS504			L	T	P	C
COURSE NAME	SOFTWARE ENGINEERING			3	0	4	5
C	P	A		L	T	P	H
2.8	0.8	0.0		3	0	4	7

Objective:

Objective of software engineering course are understand the software life cycle models and software development process and elicit, analyze and specify software requirements, design, develop correct and robust software products, testing and adaptation of software maintenance and emerging trends in software engineering.

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+ 12

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:
1. Feasibility study for any two application
2. Project Planning for the above application
3. Software requirement analysis for any two application
4. Write SRS for any two application
5. 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:

6.	Draw use-case, class for any two applications.	
7.	Draw sequence and collaboration diagram for any two applications.	
8.	Draw activity and state chart for any two applications.	
9.	Component, package and deployment diagram for any two applications.	

UNIT-III	TESTING	9 + 12

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:

10. Generate and Implementation of skeleton code for any two application
11. Writing test cases for any two application
12. Testing process for any two application
13. 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	30	75

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. PankajJalote- An Integrated Approach to Software Engineering, 3rd edition 2011.
3. C.RavindranathPandian, "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.

E REFERENCES

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												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
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												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
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	XCS505	L	T	P	C
COURSE NAME	**IT WORKSHOP(SCILAB/MATLAB)**	1	0	4	3
PREREQUISITES	Working knowledge of some basic application software (Excel). Basic knowledge of computer programming and an understanding of matrix and linear algebra are highly beneficial.	L	T	P	H
C:P:A	0.25:2.0:0.75	1	0	4	5

Learning Objectives

- Understanding the MATLAB environment
- Being able to do simple calculations using MATLAB
- Being able to carry out simple numerical computations and analyses using MATLAB

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	Understand the main features of the MATLAB development environment	Cognitive, Psychomotor Affective	Understand Guided Response Responding
CO2	Use the MATLAB GUI effectively	Cognitive Psychomotor	Understand Guided Response Responding
CO3	Design simple algorithms to solve problems	Cognitive Psychomotor Affective	Apply Guided Response Responding
CO4	Write simple programs in MATLAB to solve scientific and mathematical problems	Cognitive Psychomotor Affective	Apply Guided Response Responding
CO5	graphical representations and tips for designing and implementing MATLAB code	Cognitive Psychomotor Affective	Apply Guided Response Responding

THEORY	
MATLAB basics, The MATLAB environment, Basic computer programming Variables and constants, operators and simple calculations ,Formulas and functions, MATLAB toolboxes Matrix and linear algebra review ,Vectors and matrices in MATLAB,Matrix operations and functions in MATLAB Reading and writing data, file handling ,Personalized functions ,Toolbox structure ,MATLAB graphic functions	**15**
EXPERIMENTS	**30**
1. Study of Introduction to MATLAB 2. Study of basic matrix operations 3. To solve linear equation 4. Solution of Linear equations for Underdetermined and over determined cases. 5. Determination of Eigen values and Eigen vectors of a Square matrix. 6. Solution of Difference Equations. 7. Solution of Difference Equations using Euler Method. 8. Solution of differential equation using 4th order Runge- Kutta method. 9. Determination of roots of a polynomial. 10. Determination of polynomial using method of Least Square Curve Fitting. 11. Determination of polynomial fit, analyzing residuals, exponential fit and error bounds from the given data.	

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

REFERENCES

1. Amos Gilat 'MATLAB, An Introduction With Applications',3rd edition, Wiely publishers,2008
2. Stephen J. Chapman' MATLAB Programming for Engineers' 5th edition,Cengauge learninb,2016
3. Holly Moore 'MATLAB for Engineers', 5th edition, Pearson, 2012

Table 1: Mapping of COs with POs:

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

1-5→1, 6-10→2, 11-15→3

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

SUBCODE	XCSM01		L	T	P	C

SUB NAME	Programming with Python	0.5	0	0.5	1
PREREQUISITES	-	L	T	P	H
C:P:A		1	0	1	2

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

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	6

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.

UNITIII	FUNCTION AND REGULAR EXPRESSION	6

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	6

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	6

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	PRACTICAL	TOTAL
	15	0	15	30

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

COURSE CODE	XCS601		L	T	P	C
COURSE NAME	COMPILER DESIGN		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	*Describe* the compilers and its construction tools and specification of tokens.	Cognitive	Remember
CO2	*Describe* and *apply* various parsing techniques for parsing the string.	Cognitive, Psychomotor	Understand Guided Response
CO3	*Illustrate* and *construct* intermediate language**.	Cognitive, Psychomotor	Understand Guided Response
CO4	*Describe* **t**he code generation and *make use of* code generator to generate target code.	Cognitive, Psychomotor	Understand Guided Response
CO5	*Explain* code optimization and **apply** the optimization technique	Cognitive, Psychomotor	Understand Guided Response

UNIT I   INTRODUCTION TO COMPILING   9 + 12

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 IISYNTAX ANALYSIS   9 +8

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 IIIINTERMEDIATE CODE GENERATION   9 + 5

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 IVCODE GENERATION	9 + 2

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	9 + 3

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

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. HenkAlblas 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												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	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	9	14	12	11	8	5	0	0	7	5	0	7	15	10

COURSE CODE	XCS602			L	T	P	C
COURSE NAME	COMPUTER NETWORKS			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	*Understanding* the networks components and *Analyzing* the various network components.	Cognitive	Understand,
CO2	*Describe and Recognize* the network error detection and correction methods.	Cognitive	Remember, Apply,
CO3	*Identify and interpret the* network switching and addressing methods and *develop* the various routing simulations.	Cognitive Psychomotor	Remember, Understand, Guided response
CO4	*Analyse* a transport layer functions and *setup* connection oriented protocol.	Cognitive Psychomotor	Analyze, Create Perception
CO5	*Describe* the Application layer functions and network security and *Build* simple NS2 simulations	Cognitive Psychomotor Affective	Understand Guided Response Receive

UNIT I DATA COMMUNICATIONS	9

Components- Direction of Data flow-networks- Components and Categories – types of connections- Topologies- Protocols and Standards – ISO/OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems.

UNIT II DATA LINK LAYER	9 +15

Error – Detection and Correction – Parity – LRC - CRC – Hamming code – low Control and Error control – stop and wait – go back –N ARQ – selective repeat ARQ – Sliding window – HDLC – LAN – Ethernet IEEE 802.3 - IEEE 802.5 - IEEE 802.11 – FDDI – SONET – Bridges.

List of Programs

1. (a) Implement Single Bit Parity generator and checker using 'C' program.

(b) Implement two dimensional parity generator and checker using 'C' program.
2. (a) Implement Cyclic Redundancy checks sender and receiver using c program.

(b) Implement checksum sender and receiver using 'C' program.
3. Simulate Stop & Wait protocol.
4. Implement error detection in data transmission using Hamming code.
5. Implement bit stuffing sender and receiver using c program.

UNIT III NETWORK LAYER	9 + 6

Internetworks – Packet switching and Datagram approach – IP addressing methods – subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.

List of Programs

7. Simulate the distance vector routing algorithm.
8. Simulate the link state routing algorithm.
.

UNIT IV TRANSPORT LAYER	9 + 6

Duties of Transport Layer – Multiplexing – De multiplexing – Sockets – User Datagram Protocol(UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of Service (QOS) – Integrated Services.
List of Programs
9. Implement echo Server sender and receiver using TCP.
10. Implement the Time Server sender and receiver using TCP.

UNIT V APPLICATION LAYER	9 + 3

Domain Name Space (DNS) – SMTP – POP 3 – FTP – HTTP – WWW- Security - Cryptography Case study on TCP/IP Architecture.
List of Experiments:
11. Simulate the file transfer protocol using TCP.
12. Implement byte stuffing sender and receiver using c program.
13. To study NS2-Simple programs.

	LECTURE	PRACTICAL	TOTAL
	45	30	75

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

E REFERENCES
1. http://nptel.ac.in/courses/106105081/
2. Nptel videos Computer Networks by Prof. SujoyGhosh Department of Computer Science & Engineering Indian Institute of Technology, Kharagpur.
3. E-Tools: https://www.wireshark.org/

1.W. STALLINGS, "**Data and Computer Communication**", 8th edition, Pearson Education, 2006,
2. Larry L. Peterson and Peter S.Davie**, "Computer Networks"**, Harcourt Asia Pvt Ltd., Second Edition

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/

COURSE CODE	XUM606	L	T	P	C
COURSE NAME	ECONOMICS FOR ENGINEERS	3	0	0	3
PREREQUISITES		L	T	P	H
C:P:A	2.64:0.24:0.12	3	0	0	3

Learning Objectives

➢ To provide comprehensive coverage of economical concepts for precise decision makings in engineering domains.

➢ To develop the ability of engineers to analysis the cost and revenue by using economical tools.

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	*Explain* the concepts of economics in engineering and *identify* element of cost to prepare cost sheet	Cognitive Psychomotor	Understand Perception
CO2	*Calculate and Explain* the Break-even point and marginal costing	Cognitive Psychomotor	Understand &Apply Perception
CO3	*Summarize* and *Use* value engineering procedure for cost analysis	Cognitive Affective	Understand Receive
CO4	*Estimate* replacement problem	Cognitive	Understand
CO5	*Compute, Explain* and *make Use of* different methods of depreciation	Cognitive	Understand &Apply

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:DEPRECIATION	**10**

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.

UNIT IV: REPLACEMENT AND MAINTENANCE ANALYSIS	07

Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset – capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely.

UNIT V:INFLATION AND PRICE CHANGE	08

Definition, Effects, Causes, Price Change with Indexes, Types of Index, Composite
vs Commodity Indexes, Use of Price Indexes in Engineering Economic Analysis, Cash Flows that inflate atdifferent Rates.

	LECTURE	TUTORIAL	TOTAL
HOURS	45	0	45

TEXT BOOKS

1. G. Rajendra et.al., "Engineering Economy 1st Edition", New Age International,2006
2. S.P.Jain&Narang, "Cost accounting – Principles and Practice", Kalyani Publishers, Calcutta, 2012.

REFERENCES

1. James L.Riggs,David D. Bedworth, Sabah U. Randhawa : Economics for Engineers 4e , Tata McGraw-Hill
2. Donald Newnan, Ted Eschembach, Jerome Lavelle : Engineering Economics Analysis, OUP
3. John A. White, Kenneth E.Case,DavidB.Pratt : Principle of Engineering Economic Analysis, John Wiley
4. Sullivan and Wicks: Engineering Economy, Pearson

Table 1 : Mapping of CO's 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$_{12}$
CO1	1	2	0	1	0	0	1	1	1	2	2	3
CO2	2	2	1	2	0	0	2	1	1	2	3	3
CO3	2	2	1	3	0	0	2	2	1	2	2	3
CO4	1	2	1	2	0	0	0	1	1	1	2	3
CO5	1	2	0	1	0	0	1	1	0	1	2	3
Scaled	1	2	1	2	0	0	1	1	1	2	2	3

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

SUBCODE	XCSM02			L	T	P	C
SUB NAME	WEB DESIGN			0.5	0	0.5	1
PREREQUISITES	HTML and Designing Tools			L	T	P	H
C:P:A 0.5:0.5:0				1	0	1	2

COURSE OUTCOMES			Domain	Level
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	6

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	6

Introduction – Installation – Architecture – Control Panel – Toolbar – Menus – Content Menu – Components Menu – Extensions Menu – Help Menu.

UNIT IIIJOOMLA MENUS	6

Create Menus – Adding Menu Items – Modifying Menu Items – Creating Submenus

UNIT IV JOOMLA MODULES	6

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	6

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

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, ElinWaring, "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.

COURSECODE	COURSENAME	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:
14. Feasibility study for any two application
15. Project Planning for the above application
16. Software requirement analysis for any two application
17. Write SRS for any two application
18. 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:
19. Draw use-case, class for any two applications.
20. Draw sequence and collaboration diagram for any two applications.
21. Draw activity and state chart for any two applications.
22. 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:
23. Generate and Implementation of skeleton code for any two application
24. Writing test cases for any two application
25. Testing process for any two application
26. 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. PankajJalote- An Integrated Approach to Software Engineering, 3rd edition 2011.
3. C.RavindranathPandian, "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.

E REFERENCES

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	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO 2
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	PO10	PO11	PO12	PSO 1	PSO 2
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

COURSECODE	COURSENAME	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 tosolve, 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 DATA12+ 3

Introduction to Big Data Platform – Challenges of Conventional Systems - Nature of DataEvolution 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 ANALYSIS12 + 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 VISUALIZATION12+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 APPLICATIONS12+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. AnandRajaraman 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:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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 VsStateful 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, SunitBelapure, "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. VivekSood, "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/
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3. http://sectools.org/tool/hydra/
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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	PO10	PO11	PO12	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	PO10	PO11	PO12	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

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
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

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	*Identify* 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

COURSE CODE		XCSE53		L	T	P	C
COURSE NAME		DATA COMMUNICATION		3	1	0	4
C	P	A		L	T	P	H
3.0	1.0	0.0		3	2	0	5

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	*Understand* the basic concepts for data communication	Cognitive	Knowledge,
CO2	*Understand* the error detection and error correction in the data link layer.	Cognitive	Analysis
CO3	*Understand and analyze* networks layer functions and subnet creation	Cognitive	Knowledge, Analysis
CO4	*Understand* the concepts of transport layer	Cognitive	Knowledge
CO5	*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

REFERENCES

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

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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

SUBCODE	XCSE61	L	T	P	C
SUB NAME	**WEB AND INTERNET TECHNOLOGY**	3	0	0	3
PREREQUISITES		L	T	P	H
C	P	A		3	0	0	3
3.0	0.0	0.0					

COURSE OUTCOMES		Domain	Level
CO1:	*Understand the* technological foundations of the Internet and core Internet protocols	Cognitive	Knowledge
CO2:	*Understand* the fundamental tools and technologies for web design.	Cognitive	Knowledge
CO3:	*Develop* code to demonstrate, understanding of knowledge related to XML	Cognitive	Knowledge, Understand
CO4:	*Identify* and *outline* the threats, firewalls and authentication mechanism.	Cognitive	Knowledge, Understand
CO5:	*Use* fundamental skills to host a website.	Cognitive	Knowledge, Understand

UNIT I	INTRODUCTION TO INTERNET	9

Introduction, Evolution of Internet, Internet Applications, Internet Protocol -TCP/IP, UDP, HTTP, Secure HTTP(SHTTP) Internet Addressing – Addressing Scheme – Ipv4 & IPv6, Network Byte Order, Domain Name Server and IP Addresses, Mapping, Internet Service Providers, Types Of Connectivity Such As Dial-Up Leaded Vsat Etc. Web Technologies: Three Tier Web Based Architecture; JSP, ASP, J2EE .Net Systems.

UNIT II	HTML CSS AND SCRIPTING	9

HTML - Introduction, SGML, DTD(Document Type Definition, Basic Html Elements, Tags and usages, HTML Standards , Issues in HTML DHTML: Introduction Cascading Style Sheets: Syntax ,Class Selector, Id Selector DOM (Document Object Model) & DSO (Data Source Object) Approaches To Dynamic Pages: CGI, Java Applets, Plug Ins, Active X, Java Script – Java Script Object Model, Variables-Constant – Expressions, Conditions- Relational Operators- Data Types – Flow Control – Functions & Objects-events and event handlers – Data type Conversion & Equality – Accessing HTML form elements.

UNIT III XML		9

What is XML – Basic Standards, Schema Standards, Linking & Presentation Standards, Standards that build on XML, Generating XML data, Writing a simple XML File, Creating a Document type definition, Documents & Data ,Defining Attributes & Entities in the DTD ,Defining Parameter Entities & conditional Sections, Resolving a naming conflict, Using Namespaces, Designing an XML data structure, Normalizing Data, Normalizing DTDS.

UNIT IV	INTERNET SECURITY & FIREWALLS	9

Security Threats From Mobile Codes, Types Of Viruses, Client Server Security Threats, Data & Message Security, Various electronic payment systems, Introduction to EDI, Challenges–Response System, Encrypted Documents And Emails , Firewalls: Hardened Firewall Hosts, IP- Packet Screening, Proxy Application Gateways, AAA (Authentication ,Authorization And Accounting)

UNIT V WEBSITE PLANNING & HOSTING	9

Introduction, Web Page Lay-Outing, Where To Host Site, Maintenance Of Site, Registration Of Site On Search Engines And Indexes, Introduction To File Transfer Protocol, Public Domain Software, Types Of FTP Servers (Including Anonymous),FTP Clients Common Command. Telnet Protocol, Server Domain, Telnet Client, Terminal Emulation. Usenet And Internet Relay Chat.

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

TEXT

1.Internet& Intranet Engineering- Daniel Minoli, TMH.
2. Alexis Leon and Mathews Leon – Internet for Every One, Tech World.3. Fred Halsall, "Multimedia Communications, Applications Networks Protocols andStandards", Pearson Education, Asia 2002; Chapters: 3,4,5.

REFERENCES

1. Eric Ladd, Jim O'Donnel –"Using HTML 4, XML and JAVA"-Prentice Hall of India 1999.
2. "Beginning Java Script "– Paul Wilton – SPD Publications –2001.
3. Frontiers of Electronics of Commerce, Ravi kalakota& Andrew B. Whinston
4. Addison WesleyAdvance Java– Gajendra Gupta , firewall Media

E REFERENCE

1. NPTEL , Communication Engineering, Prof. Surendra Prasad, Department of Electrical Engineering Indian Institute of Technology, Delhi HauzKhas New Delhi -110 016

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

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

Original	10	8	10	11	3	0	0	0	0	0	0	0	9	6
Scaled to 0,1,2,3 scale	2	2	2	3	1	0	0	0	0	0	0	0	2	2

COURSE CODE	XCSE65					L	T	P	C

COURSE NAME	DATA MINING			3	0	0	3
C	P	A		L	T	P	H
3.0	0.0	0.0		3	0	0	3
PREREQUISITES	DATABASE MANAGEMENT SYSTEM						

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	Describe the different data mining techniques and compare data mining systems with database systems	Cognitive	Understand
CO2	Apply the concepts of pre-processing and characterization	Cognitive	Apply
CO3	Construct a classifier from the given dataset by using classification algorithms	Cognitive	Apply
CO4	Discover clusters for a given database by applying clustering algorithms	Cognitive	Apply
CO5	Describe the concepts of Knowledge Mining - Web Mining – Text Mining- Spatial Mining - Temporal Mining.	Cognitive	Understand

UNIT – I INTRODUCTION	9 Hours

Concepts of Data Mining- Issues and Challenges –Data Mining Functionalities- Migration of Data Mining to DataWarehouse- Machine Learning –Taxonomy of Data Mining Tasks – Steps in Data Mining Process – Overview of Data Mining techniques.

UNIT – II DATA PRE-PROCESSING AND CHARACTERIZATION	9 Hours

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 – III CLASSIFICATION	9 Hours

Classification – Decision Tree Induction – Bayesian Classification - SVM Classification – Prediction –Back Propagation.

UNIT – IV CLUSTERING	9 Hours

Introduction to Clustering- Cluster Analysis –K-Means Clustering– Hierarchical Method – Density Based Method – Grid Based Method – Outlier Analysis.

UNIT – V ADVANCED TECHNIQUES AND APPLICATIONS	9 Hours

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

TEXT BOOK:
1. Jiawei Han, MichelineKamber, "Data Mining: Concepts and Techniques", Morgan Kaufman Publishers, 2000.

REFERENCES:

1. ArunK.Pujari, "Data Mining Techniques", Second Edition, Universities Press, 2010.

2. K.P.Soman, ShyamDiwakar, V.Ajay, "Insight into Data Mining – Theory and Practice", Prentice Hall of India, 2006.

3. UsamaM.Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth, RamasamyUthurusamy,

"Advances in Knowledge Discovery and Data Mining", The M.I.T. Press, 1996.

4. D. Hand, H. Mannila and P. Smyth. Principles of Data Mining. Prentice-Hall. 2001

5. Alex Berson, Stephen Smith, Kurt Thearling, "Building Data Mining Applications for CRM", Tata McGraw Hill, 2000.

6. Margaret Dunham, "Data Mining: Introductory and Advanced Topics", Prentice Hall, 2002.

7. I.H. Witten and E. Frank. Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann. 2000.

8. E-books - http://www.kdnuggets.com/publications/books.html

CO Vs PO Mapping

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

Scale :3-Strong   2- Medium   1 – Low

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 caseswhich 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 reviewresults 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. SrinivasanDesikan and Gopalaswamy Ramesh, " Software Testing – Principles and Practices", Pearson education, 2010.
2. AdityaP.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:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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
XCSE76	**ARTIFICIAL INTELLIGENCE AND EXPERT**	**3**	**0**	**0**	**3**

		SYSTEM					
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 AI9

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.

	LECTURE	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:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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

COURSECODE	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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2			2				1	1		2	2	1
CO2	2	2	1	1	3				3	3		2	3	3
CO3	3	2	1	2	3				3	3		2	3	3
CO4	3	3	2	2	3				3	3		2	3	3
CO5	2	2	1	1	3				1	3		2	3	2
	12	11	5	6	14				11	13		10	14	12

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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

COURSECOD	COURSE NAME		L	T	P	C

E					
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:

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	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