ANNEXURE I

GOA UNIVERSITY

FIRST YEAR OF BACHELOR'S DEGREE COURSE IN ENGINEERING (Revised in 2007-08)

SCHEME OF INSTRUCTION AND EXAMINATION

SEMESTER I (Common for all branches of Engineering)

Sub code	Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Marks				
						Th.	S	P	O	Total
1.1	Applied Mathematics I	4	-	-	3	100	25	-	-	125
1.2	Applied Sciences I(Physics & Chemistry)	4	-	2	3	100	50	-	-	150
1.3	Basic Civil Engineering and Engineering Mechanics.	4	-	2	3	100	25	-	-	125
1.4	Basic Electrical Engineering	3	-	2	3	100	25	-	-	125
1.5	Engineering Graphics	2	-	4	4	100	50	-	-	150
1.6	Communication Skills	3	-	-	3	100	25	-	-	125
1.7	Workshop Practice - I	-	-	4	-	-	50	-	-	50
	TOTAL	**20**		**14**		**600**	**250**			**850**

L:Lectures, T : Tutorials, P : Practicals. Th. Dur.:Duration of Theory Paper
Th: Theory, S : Sessional, P : Practical, O : Oral.

25 Sessional marks will be split as follows: 20 marks are for the Internal Test, 5 marks are for continuous evaluation of Practicals/Assignments

SEMESTER II: (Common for all branches of Engineering)

Sub code	Subjects	Scheme Of Instruction Hrs/Week			Scheme Of Examination					
		L	T	P	Th.Dur (Hrs)	Marks				
						Th.	S	P	O	Total
2.1	Applied Mathematics II	4	-	-	3	100	25	-	-	125
2.2	Applied Sciences II(Physics & Chemistry)	4	-	2	3	100	50	-	-	150
2.3	Information Technology	4	-	2	3	100	25	-	-	125
2.4	Basic Mechanical Engineering	3	-	2	3	100	25	-	-	125
2.5	Basic Electronic Engineering	3	-	2	3	100	25	-	-	125
2.6	Environmental and Social Sciences	4	-	-	3	100	50	-	-	150
2.7	Workshop Practice II Modern	-	-	4	-	-	50	-	-	50
	TOTAL	**22**		**12**	**-**	**600**	**250**	**-**	**-**	**850**

L: Lectures, T : Tutorials, P : Practicals. Th. Dur. : Duration of Theory Paper
Th : Theory, S : Sessional, P : Practical, O : Oral.
25 Sessional marks will be split as follows: 20 marks are for the Internal Test, 5 marks are for continuous evaluation of Practicals/Assignments

GOA UNIVERSITY

SECOND YEAR OF BACHELOR'S DEGREE COURSE IN INFORMATION TECHNOLOGY
SCHEME OF INSTRUCTION AND EXMINATION (Revised in 2007-08)

SEMESTER III

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
IT 3.1	Applied Mathematics III	3	1	0	3	100	25	-	-	125
IT 3.2	Numerical Methods	3	0	2	3	100	20 + 5	-	-	125
IT 3.3	Analog & Digital Circuits	3	1	2	3	100	20 + 5	-	-	125
IT 3.4	Computer Organization & Architecture	3	1	2	3	100	20 + 5	-	-	125
IT 3.5	Data Structures using C	3	1	2	3	100	20 + 5	50	-	175
IT 3.6	System Analysis & Design	3	1	2	3	100	20 + 5	50	-	175
	TOTAL	18	05	10	-	600	150	100	-	850

L- Lectures, T- Tutorials, P- Practicals
Th-.Dur.- Duration of Theory paper, Th-Theory, S-Sessional, P- Practicals, O-Oral.
25 Sessional marks will be split as follows: 20 marks are for the Internal Test,
5 marks are for continuous evaluation of Practicals/Assignments

SEMESTER IV

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total

IT 4.1	Discrete Mathematical structures	3	1	0	3	100	20 + 5	-	-	125
IT 4.2	Signals & Systems	3	1	0	3	100	20 + 5	-	-	125
IT 4.3	Computer Hardware & Troubleshooting	3	1	2	3	100	20 + 5	-	-	125
IT 4.4	Microprocessors & Interfacing	3	1	2	3	100	20 + 5	50	-	175
IT 4.5	Design & Analysis of Algorithms	3	1	2	3	100	20 + 5	-	-	125
IT 4.6	Object Oriented Programming System	3	1	2	3	100	20 + 5	50	-	175
	TOTAL	18	06	08	-	600	150	100	-	850

L- Lectures, T- Tutorials, P- Practicals

Th-.Dur.- Duration of Theory paper, Th-Theory, S-Sessional, P- Practicals, O-Oral.

25 Sessional marks will be split as follows: 20 marks are for the Internal Test,

5 marks are for continuous evaluation of Practicals/Assignments

GOA UNIVERSITY

THIRD YEAR OF BACHELOR'S DEGREE COURSE IN INFORMATION TECHNOLOGY
SCHEME OF INSTRUCTION AND EXMINATION (Revised in 2007-08)

SEMESTER V

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
IT 5.1	Introduction to Data Communication	3	1	0	3	100	20 + 5	-	-	125
IT 5.2	Digital Signal Processing	3	1	0	3	100	20 + 5	-	-	125
IT 5.3	Software Engineering	3	1	2	3	100	20 + 5	-	-	125
IT 5.4	Intelligent Agents	3	1	2	3	100	20 + 5	-	-	125
IT 5.5	Operating Systems	3	1	2	3	100	20 + 5	50	-	175
IT 5.6	Database Management Systems	3	1	2	3	100	20 + 5	50	-	175
	TOTAL	18	06	08	-	600	150	100	-	850

L- Lectures, T- Tutorials, P- Practicals,
Th-.Dur.- Duration of Theory paper, Th-Theory, S-Sessional, O-Oral.
25 Sessional marks will be split as follows: 20 marks are for the Internal Test,
5 marks are for continuous evaluation of Practicals/Assignments

SEMESTER VI

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
IT 6.1	Entrepreneurship Development	3	0	0	3	100	20 + 5	-	-	125
IT 6.2	Theory of Computation	3	0	2	3	100	20 + 5	-	-	125
IT 6.3	Computer Networks	3	1	2	3	100	20 + 5	-	-	125
IT 6.4	Computer Graphics	3	1	2	3	100	20 + 5	50	-	175
IT 6.5	Web Technology	3	1	2	3	100	20 + 5	50	-	175
IT 6.6	Software Testing & Quality Assurance	3	1	2	3	100	20 + 5	-	-	125
	TOTAL	18	04	10	-	600	150	100	-	850

L- Lectures, T- Tutorials, P- Practicals,
Th-.Dur.- Duration of Theory paper, Th-Theory, S-Sessional, O-Oral.
25 Sessional marks will be split as follows: 20 marks are for the Internal Test,
5 marks are for continuous evaluation of Practicals/Assignments

GOA UNIVERSITY
FINAL YEAR OF BACHELOR'S DEGREE COURSE IN INFORMATION TECHNOLOGY
SCHEME OF INSTRUCTION AND EXMINATION

SEMESTER VII

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	P	O	Total
IT 7.1	Distributed Systems	3	1	2	3	100	20 + 5	-	50	175
IT 7.2	Principles of Compilers	3	1	2	3	100	20 + 5	-	50	175
IT 7.3	Mobile Computing	3	1	2	3	100	20 + 5	-	-	125
IT 7.4	Elective I	3	1	2	3	100	20 + 5	-	50	175
IT 7.5	Elective II	3	1	0	3	100	20 + 5	-	-	125
IT 7.6	Project	-	-	4	-	-	25	-	50#	75
	TOTAL	15	05	12	-	500	150	-	200	850

25 Sessional marks will be split as follows: 20 marks are for the Internal Test,
5 marks are for continuous evaluation of Practicals/Assignments
Seminar and Oral

Electives: A student must take One Elective from each Group.

Group I: Subjects for IT 7.4
a) Data Mining & warehousing
b) Genetic Algorithms
c) Bio Informatics
d) E-Commerce

Group II: Subjects for IT 7.5
a) Geographical Information System
b) Cyber laws & Computer Forensic
c) Financial Engineering
d) IT Business Methodology

SEMESTER VIII

Sub Code	Subjects	Scheme of Instruction Hrs/Week			Scheme of Examination					
		L	T	P	Th. Dur (Hrs)	Marks				
						Th.	S	Pract/ Report	O	Total
IT 8.1	Image processing & Pattern Recognition	3	1	2	3	100	20 + 5	-	50	175
IT 8.2	Computer Cryptography and Network Security	3	1	2	3	100	20 + 5	-	50	175
IT 8.3	Elective III	3	1	2	3	100	20 + 5		50	175
IT 8.4	Elective IV	3	1	2	3	100	20 + 5	-	50	175
IT 8.5	Project	-	-	8	-	-	50	50	50#	150
	TOTAL	12	04	16	-	400	150	50	250	850

25 Sessional marks will be split as follows: 20 marks are for the Internal Test,
5 marks are for continuous evaluation of Practicals/Assignments
Demonstration & Oral

Electives: A student must take One Elective from each Group.

Group III: Subjects for IT 8.3
a) Web Services
b) Operation Research
c) Design Patterns & Frameworks
d) Fuzzy Logic and Neural Networks

Group VI: Subjects for IT 8.4
a) VLSI Design
b) Embedded System Design
c) System Performance & Evaluation
d) Advanced Computer Architecture

ANNEXURE II

1.1 APPLIED MATHEMATICS-I

Total no. of lectures per week	: 04 hours
Duration of the semester end examination	: 03 hours
Maximum marks for semester end examination	: 100
Maximum marks for internal assessment	: 20 + 5
Total marks	: 125

Semester end examination is of 100 marks and the question paper consists of 4 modules and 8 questions. Each module carries 2 questions of 20 marks each. Out of these 8 questions, 5 questions are to be attempted, choosing at least one from each module.

MODULE I

Beta and Gamma functions: Various forms and properties, relation between Beta and Gamma functions, Legendre's duplication formula, Error function.

Infinite sequence and Infinite series: Convergence and Divergence of sequences and series, tests for Convergence and Divergence of infinite series such as Integral test, Comparison test, D' Alemberts ratio test, Cauchy's root test and Leibnitz test for Alternating series, Power series and Radius of Convergence.

MODULE II

Complex variables: Complex numbers and their properties, Modulus and Argument of Complex number, Polar and Exponential form of Complex number, Geometric interpretation of Complex numbers, De Moivre's theorem and its applications, Exponential, Trigonometric, Hyperbolic and Logarithmic functions, Inverse Trigonometric and Hyperbolic functions, Continuity, Differentiability and Analytic functions. Cauchy-Reiman equations, Harmonic functions.

MODULE III

Differential Calculus: Leibnitz theorem, Taylor's theorem (without proof), Taylor's and Maclaurin's series expansion, Indeterminate forms, Partial Differentiation, Total Differentiation.

MODULE IV

Partial differential Equations and Extreme Values of Functions: Formation of first order Partial Differential Equations, Methods to solve first order Partial Differential Equations, Euler's theorem on Homogenous functions, Extreme values of functions of two and three variables, Lagrange's method of Undetermined Multipliers.

TEXT BOOKS:

1. Applied mathematics-P.N.Wartikar and J.N.Wartikar Vol- I and Vol-II

REFERENCE BOOKS:

1. Advanced Engineering Mathematics-Erwin Kreysig.
2. Applied Mathematics: Ch. V. Ramana Murthy and N. C. Srinivas
3. Higher Engineering Mathematics: Dr. B. S. Grewal

1.2 APPLIED SCIENCES-I

Total no of Lectures per Week : 04 hours
Practicals per week : 02 hours
Duration of semester end examination : 03 hours
Maximum marks for semester end examination: 100, Section I (50), Section II (50)
Maximum marks for internal assessment : Total 50, Section I (20+ 5) & Section II(20+5)
Total Marks : 150
No. of Sections : 02

The question paper will consist of 8 questions divided into two sections, Total of 4 questions are to be attempted, answering 1 question from each module, each question will carry 25 marks. There shall be 2 questions from each module.

SECTION – I (APPLIED PHYSICS)

MODULE I

INTERFERENCE OF LIGHT:
Interference based on division of amplitude, phase change at reflection, geometric and optical path, Interference due to reflected and transmitted light in thin parallel films, Interference in wedge shaped film, Newton's rings for reflected and transmitted light. Determination of radius of curvature of plano-convex lens, wavelength of light used and refractive index of liquid. Applications of interference, optical flatness, Antireflection films–amplitude and phase conditions, Derivation of formula $\mu_f = \sqrt{\mu_g}$, $\mu_f t = \lambda/4$ (10hrs)

SEMICONDUCTORS:
Mobility, drift velocity, conductivity of charge carriers, generation and recombination of charges, Diffusion, Continuity equation, Hall effect. (5hrs)

MODULE II

ULTRASONICS:
Production of ultrasonic waves, magnetostriction, Piezo-electric oscillator, detection of ultrasonic waves, properties, cavitation, Applications of ultrasonics in various fields. Measurement of wavelength, velocity by means of acoustic diffraction grating. (7hrs)

ELECTRON BALLISTICS: Electrostatic and Magnetic focusing, CRO and applications. (6hrs)

PARTICLE DETECTORS: Ionisation chamber and GM counter. (2hrs)

SECTION – II (APPLIED CHEMISTRY)

MODULE – III

ELECTROCHEMICAL ENERGY SYSTEMS

Single electrode potential, Definition, Sign conventions. Derivation of Nernst equation. Standard electrode potential, Definition, Construction of Galvanic Cell – classification, representation, emf of an electrochemical cell. Concentration cells. Reference electrodes, Calomel electrode, Ag/AgCl electrode. Numerical problems on electrode potential and emf. Ion-selective electrode, glass electrode, determination of pH using glass electrode. (8 Hrs)

CONVERSION AND STORAGE OF ELECTROCHEMICAL ENERGY

Battery Technology – Batteries – Basic Concepts, battery characteristics, classification of batteries. Construction working and applications of Zn – air, Nickel – Metal hydride and Lithium – MnO_2 batteries.

Fuel cells: Introduction, types of fuel cells – Alkaline, phosphoric acid and Molten Carbonate fuel cells. Solid polymer electrolyte and solid oxide fuel cells, construction and working of $H_2 – O_2$ and Methanol – Oxygen fuel cell. (7 Hrs)

MODULE IV

CORROSION SCIENCE

Corrosion: - Definition, chemical corrosion and Electrochemical theory of corrosion.
Types of corrosion, Differential metal corrosion, Differential aeration corrosion (pitting and waterline corrosion), Stress corrosion. Factors affecting the rate of corrosion.

Corrosion control: - Inorganic coatings – Anodizing and phosphating, metal coatings – Galvanization and Tinning, corrosion inhibitors, cathodic and anodic protection. (8 Hrs)

METAL FINISHING

Technological importance of metal finishing. Significance of polarization, decomposition potential and overvoltage in electroplating processes, effect of plating variables on the nature of electrodeposit, surface preparation and electroplating of Cr and Au.

Electroless plating:-

Distinction between electroplating and electroless plating, advantages of electroless plating. Electroless plating of Copper on PCB and Nickel. (7 Hrs)

EXPERIMENTS IN APPLIED PHYSICS

1. Newton's Rings

2. Air-Wedge
3. Zener diode characteristics
4. Voltage regulator
5. Rectifiers
6. Use of CRO

NOTE: Minimum of 4 experiments have to be completed per semester.

EXPERIMENTS IN APPLIED CHEMISTRY

1. Conductometric estimation of an acid using standard NaOH solution.
2. Determination of pKa of a weak acid using pH meter.
3. Determination of viscosity of oil using Redwood viscometer.
4. Determination of viscosity coefficient of a given liquid using Ostwald's viscometer.
5. Colorimetric determination of copper.
6. Flame photometric estimation of sodium in the given water sample.

Reference

1. Vogels text book of quantitative inorganic analysis, revised by J. Bassett, R. C. Denny, G.H. Jeffary, 4th Ed.
2. Practical Engineering Chemistry by Sunita & Ratan.

APPLIED PHYSICS

Text books

1. Applied Physics – V R Doiphode
2. Engineering Physics – Uma Mukherji
3. Applied Physics – Patgaonkar

Reference books

1. Engineering Physics – Gaur And Gupta
2. Engineering Physics – M.N. Avadhanulu, P.G. Kshirsagar
3. Engineering Physics – A.S.Vasudev

APPLIED CHEMISTRY

Text Books

1. A text book of Engineering chemistry by Jain and Jain. Dhanapatrai Publications, New Delhi.
2. Engineering chemistry by M. M. Uppal Khanna Publishers, Sixth Edition, 2001.

Reference books

1. Principles of Physical chemistry B. R. Puri, L. R. Sharma & M. S. Pathama, S. Nagin Chand & Co.
2. Text book of polymer Science by F. W. Billmeyer, John Wiley & sons, 1994

3. Liquid crystals and plastic crystals, Vol –I, edited by G. W. Gray and P. A. Winsor, Ellis Horwood series in Physical chemistry, New York.
4. Corrosion Engineering – by M. G. Fontana, Mc Graw Hill Publications.
5. A text book of Engineering chemistry by S. S. Dara, S. Chand Publications, New edition.

1.3 BASIC CIVIL ENGINEERING & ENGINEERING MECHANICS

Total no. of lectures per week	: 04 hours
Practicals per week	: 02 hours
Duration of the semester end examination	: 03 hours
Maximum marks for semester end examination	: 100
Maximum marks for internal assessment	: 20 + 5
Total marks	: 125

Semester end examination is of 100 marks and the question paper consists of 4 modules and 8 questions. Each module carries 2 questions of 20 marks each. Out of these 8 questions, 5 questions are to be attempted, choosing at least one from each module.

CIVIL ENGINEERING
MODULE-I

1.3.1 Introduction to Civil Engineering: Scope of different fields of Civil Engineering Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, Hydraulics, Water Resources and Irrigation Engineering, Transportation Engineering, Environmental Engineering.

1.3.1.1 MATERIALS
Concrete: Ingredients, mixing, transporting, placing, curing. Grade of concrete, properties of hardened concrete.
Structural Steel: Structural forms of steel,
Advanced materials: FRP, Aluminum, RMC and SCC

1.3.1.2 BUILDING COMPONENTS
Framed and load bearing structures, Components of a building (Sub and Superstructure)

1.3.1.3 ROADS: Type of roads, Components and their functions.

1.3.1.4 BRIDGES: Types of bridges, typical sketches of RCC and Steel bridges.

ENGINEERING MECHANICS

MODULE-II

1.3.2 Introduction to Engineering mechanics: Basic idealizations - Particle, Continuum, Rigid body and Point force; Newton's laws of motion, Definition of force, Introduction to SI units, Elements of a force, Classification of force and force systems; Principle of transmissibility of forces; Moment of a force, couple, moment of a couple, characteristics of couple, Equivalent force - couple system; Resolution of forces, composition of forces; Numerical problems on moment of forces and couples, on equivalent force - couple system.

1.3.2.1 Composition of forces: Definition of Resultant; Composition of coplanar - concurrent force system, Principle of resolved parts; Numerical problems on composition of coplanar concurrent force systems.

Composition of coplanar - non-concurrent force system, Varignon's principle of moments; Numerical problems on composition of coplanar non-concurrent force systems.
Equilibrium of forces - Definition of Equilibrant; Conditions of static equilibrium for different force systems, Lami's theorem; Numerical problems on equilibrium of coplanar – concurrent force system. Types of supports, statically determinate beams, Numerical problems on equilibrium of coplanar – non – concurrent force system and support reactions for statically determinate beams.

MODULE – III

1.3.2.2 Centroid of plane figures: Locating the centroid of triangle, semicircle, quadrant of a circle using method of integration, centroid of simple built up sections; Numerical problems. Moment of inertia of an area, polar moment of inertia, Radius of gyration, Perpendicular axis theorem and Parallel axis theorem; Moment of Inertia of rectangular, circular and triangular areas from method of integration; Moment of inertia of composite areas; Numerical problems

1.3.2.3 Friction: Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; Impending motion on horizontal and inclined planes; Wedge friction; Ladder friction; Numerical problems.

MODULE – IV

1.3.2.4 D'Alemberts principle, Work energy, Impulse momentum

1.3.2.5 Simple Lifting Machines – Mechanical advantage, velocity ratio and efficiency of machines, law of machines, conditions for machine efficiency, self-locking, study of the following machines-Single-purchase crab, Double-purchase crab, Differential wheel and axle, Differential pulley block, worm and worm wheel, Simple screw jack; Coils and Springs

TEXT BOOKS

1. S.S. Bhavikatti, K. G. Rajashekarappa " Engineering Mechanics", New Age International (P) Limited
2. T. R. Jagadeesh, M. A. Jayaram, "Elements of Civil Engineering & Engineering Mechanics", Sapna Book House

REFERENCES

1. R. S. Khurmi "A Text Book of Engineering Mechanics", S. Chand &Co.Publishers
2. A. K. Tayal " Engineering Mechanics", Umesh Publications
3. SCHAUM's Outline Series " Engineering Mechanics", McGraw Hill Publishers, New Delhi
4. G. Shanmugham, M. S. Palanchamy, "Basic Civil and Mechanical Engineering", Tata McGRaw Hill Limited.
5. Singer, F. L., Engineering Mechanics

6. Timoshenko and Young, Engineering Mechanics
7. Beer and Johnston, Engineering Mechanics, McGraw Hill
8. Shames, I. H., Engineering Mechanics, Prentice Hall Haung, I C., Engineering Mechanics

1.4 BASIC ELECTRICAL ENGINEERING

Total no. of lectures per week	: 03 Hours
Practicals per week	: 02 Hours
Duration of semester end examination	: 03 Hours
Maximum marks for semester end examination	: 100
Maximum marks for internal assessment	: 20 + 5
Total marks	: 125

Semester end examination is of 100 marks and the question paper consists of 4 modules and 8 questions. Each module carries 2 questions of 20 marks each. Out of this, 5 questions are to be attempted, choosing at least one from each module.

MODULE I

DC CIRCUITS: Circuit parameters (R, L, and C) definition from circuital, geometrical and energy viewpoint, Ohm's law, Kirchoff's current and voltage law. Series and parallel connection of circuit parameters. Star and delta transformation. Analysis of simple circuits excited by independent voltage sources for power energy, current and voltage. Thevenin's, Norton's and Maximum power transfer theorem. Illustrative examples.

MODULE II

ELECTROMAGNETISM: Concept of magnetic flux and magnetic field. Definition of terms related to magnetic field, flux density, permeability. Amperes law, Faraday's law, Lenz's law their significance and application. Fleming's rules. Electromagnetic induction, statically and dynamically induced emf, self and mutual inductance. Magnetic circuit concept and its analogue with electric circuit. Comparison between electric and magnetic circuits. Coupled circuits, coefficient of coupling. Energy stored in magnetic field. Illustraitve examples covering above topic.

MODULE III

AC CIRCUITS: Generation of sinusoidal AC voltage. Definition of various terms related to AC wave, average value, RMS value, form factor, peak factor. Concept of phasor and representation of AC quantity by phasor. Concept of leading and lagging phase angle. Addition and subtraction of sinusoidal alternating quantity. Definition of real, reactive, apparent power, power factor. Analysis with phasor diagram of circuits with R –L, R-C, R-L-C elements. Illustrative examples.
Three-phase circuits. Representation of three-phase system. Concept of phase sequence, balanced and unbalanced system. Relation between line and phase quantities for star and delta connections. Real reactive and apparent power in three-phase system.

MODULE IV

Principle of operation and construction of a single phase transformer (core and shell type). EMF equation, losses in transformer, efficiency and voltage regulation. Rating of transformer. Illustrative examples on EMF equation, efficiency, regulation current, voltage, turns ratio of transformer. Brief description of open and short circuit test on single-phase transformer.
Measurments: Construction, principle of operation of PMMC and moving iron and dynamometer type of instruments. Methods of measurement of power in three phase circuits, balanced and unbalanced load (no derivation and phasor diagram). Illustrative examples.

TEXT BOOKS

1) Principles of Electrical Engineering By V Del Toro. PHI Publication
2) Electrical and Electronics Technology By Edward Hughes Eighth edition, Pearson Education
3) Fundamentals of Electrical Engineering By Rajendra Prasad PHI Publication.

1.5 ENGINEERING GRAPHICS

Total no. of lectures per week	: 02 Hours
Practicals per week	: 04 Hours
Duration of semester end examination	: 04 hours
Maximum marks for semester end examination	: 100
Maximum marks for internal assessment	: 40 + 10
Total marks	: 150

The question paper will consist of 8 questions. There shall be 2 questions from each module. Total of 5 questions are to be attempted, answering 1 question from each module, each question will carry 20 marks.

MODULE I

Introduction to engineering graphics, different types of lines used in engineering graphics, curves involving conic sections, cycloid and in volute curves.
Projections of points, straight lines- when line is parallel to both the planes, parallel to one and perpendicular to other, line inclined to both the principle planes.

MODULE II

Projections of planes: circle, square, triangle, rectangle, pentagon, hexagon and combination of these.
Projections of solids: cube, tetrahedron, cylinder, cone, pyramid, prism.

MODULE III

Sections of solids.
Developments of lateral surfaces of the objects like cube, tetrahedron, cylinder, cone, pyramid, prism.

MODULE IV

Orthographic projection (using 1st angle projection only) of machine parts and castings etc.
Isometric projection.

PRACTICE (Excluded from theory examination):

Introduction to at least one CAD software application limited to orthographic projection and isometric projection (Minimum 04 Hrs exposure).

TEXT BOOKS:

1. Engineering Drawing- N.D.Bhat – Charotar Publishing company.
2. Engineering Drawing- K.R.Gopalkrishna-- Subash Publications.
3. Engineering Drawing - K.R. Mohan – Dhanpat Rai & Sons.

REFERENCE BOOKS:

1. Engineering Drawing- P.J.Shah – Vol. 1 & 2 – Praveen Shah Publishers.
2. Engineering Drawing- Luzadeer & Duff - PHI.

3. Engineering Drawing- P.S.Gill – S.K.Kataria & Sons.

1.6 COMMUNICATION SKILLS

Total no. of lectures per week	: 03 hours
Duration of semester end examination	: 03 hours
Maximum marks for semester end examination	: 100
Maximum marks for internal assessment	: 20 + 5
Total marks	: 125

Internal assessment will include internal tests (written) based on Modules 1 to 3 and an assignment (seminar/presentation) based on the oral component Module 4.
Semester end examination is of 100 marks and the question paper consists of 4 modules and 8 questions. Each module carries 2 questions of 20 marks each. Out of this, 5 questions are to be attempted, choosing at least one from each module.

MODULE I

Language construction

- Grammatical concepts like tenses, active and passive voice, direct and indirect speech, conjunctions, prepositions and prepositional phrases, prefixes and suffixes, degrees of comparison and idioms.
- Transformation of sentences (Affirmative, Negative, Interrogative and Exclamatory), use of 'too', 'no sooner…than', 'not only… but also', 'unless', 'so…that'.
- Correct usage of language and common errors.

Comprehension and vocabulary

- Ability to understand and interpret ideas, vocabulary building, vocabulary expansion, synonyms and antonyms, one-word substitution.
- Technical, scientific and general text with Multiple Choice questions to test analytical skills, comprehension, expression, vocabulary and grammar.

MODULE II

Summarization and Interpretation

- Techniques to summarize a given passage to test comprehension ability to present written matter in a brief and concise manner
- Precis writing.
- Note taking and Note making

Technical communication

- Report writing and Project proposal (in a letter format)
- Technical writing - framing definitions, classification, technical description of objects and process, writing instructions. (topics relevant to the first year engineering syllabus)

MODULE III

- Basic official correspondence (Notices, Minutes of the meeting, Agenda, Invitations, Memos)

- Principles of correspondence, language and style in official letters, formats of letters, claims and adjustments, methods of adjustment.
- Application letter with Curriculum Vitae/ Resume; letters of order, claims and adjustment; letters of enquiry and replies; letters requesting for duplicate marksheets, provisional marksheets, bonafide certificate, change in name etc.

MODULE IV

Oral Expression

- Principles of Effective Communication and Barriers to communication
- Types of Non Verbal Communication
- Good public speaking
  - Debates, Elocution,
  - Seminars, Presentation skills
- Effective Listening
- Attitudes in Team speaking and Do's and don'ts of Group discussion
- Job Interview – interview techniques, preparing for an interview and conducting an interview.

TEXT BOOKS:

1. Business Correspondence and Report Writing, R. C. Sharma, & Krishna Mohan, Tata McGraw Hill
2. Basic Communication Skills for Technology, Andrea J. Rutherford, Pearson Education Pte. Ltd.

REFERENCE BOOKS:

1. Objective English, Edgar and Showick Thorpe, Pearson Education
2. Professional Communications Skills, Pravin S. R. Bhatia & A. M. Sheikh, S. Chand & Company Ltd.
3. Principles and Practice of Business Communication, Rhoda A.Doctor and Aspi H. Doctor, Sheth Publications.

1.7 WORKSHOP PRACTICE – I

Practicals per week : 04 Hours

Maximum marks for internal assessment : 50

i) **FITTING: -** Demonstration of various tools and equipments used in fitting shop.

Practical: At least one job covering simple fitting practice.

ii) **PLUMBING: -** Demonstration of various tools and equipments used by plumber. Demonstration of various plumbing fittings.

Practical: At least two jobs as follows

1) G. I. Pipe fitting by threading. -------- One Job

2) P.V.C. Pipe fitting. ---------- One Job

iii) **CARPENTRY: -** Demonstration of wood cutting machines, tools and equipments.

Practical: At least two jobs as follows

1) Wooden joint. ---------- One Job

2) Wood turning. ---------- One Job

iv) **FORGING:-** Demonstration of various tools and equipments used in forging shop.

Practical: At least two different jobs covering forging practice.

2.1 APPLIED MATHEMATICS – II

Total no. of lectures per week	: 04 hours
Duration of the semester end examination	: 03 hours
Maximum marks for semester end examination	: 100
Maximum marks for internal assessment	: 20 + 5
Total marks	: 125

Semester end examination is of 100 marks and the question paper consists of 4 modules and 8 questions. Each module carries 2 questions of 20 marks each. Out of these 8 questions, 5 questions are to be attempted, choosing at least one from each module.

MODULE I

Differentiation under the Integral sign: Integral with its limit as constant and as a function of the parameter.

Curve tracing and Rectification of Plane Curves: Tracing of Plane Curves in two dimensions, Polar and Parametric forms of Plane Curves such as Cardiod, Asteroid, Cycloid, Leminiscate, Rectification of Plane Curves in Polar, Cartesian and Parametric form, Vector Differentiation, Curves in space, Tangent, Normal and Binormal vectors, Torsion and Curvature, Serret- Frenet formulas.

MODULE II

Multiple Integrals: Double Integration in Polar and Cartesian co-ordinates, change of order in Double Integration, application of Double Integration to computation of Centre of Gravity; Triple Integration in Cartesian , Spherical and Cylindrical co-ordinate systems, Geometrical interpretation of Triple Integration and applications to surface area and volume.

MODULE III

Vector calculus: Scalar and Vector fields, Directional Derivatives, Divergence and Curl of Vector fields, Gradient of a Scalar field, Line Integrals and their applications, Greens theorem in a Plane, Surface and Volume Integrals, Divergence theorem and Stroke's theorem(both without proof) and their applications.

MODULE IV

Ordinary Differential Equations: First order and first degree Ordinary Differential Equations, Method of separation of variables, Homogeneous and Non- Homogeneous Equations reducible to Homogeneous form, Linear Differential Equations, Bernoulli's Differential Equation, Exact and Non- Exact Differential Equations; higher order Differential Equation with constant coefficients and with right hand side of the form $e^{ax,}$ Sin (ax+b), Cos (ax+b), e^{ax} f(x), x^n f(x), Linear equations with variable coefficients such as Cauchy Equation and Lagrange's Equation, D- operators and Inverse D- operators, method of Variation of Parameters.

TEXT BOOKS:

1. Applied Mathematics - P.N.Wartikar and J.N.Wartikar Vol- I and Vol-II

REFERENCE BOOKS:

1. Vector Calculus: Shanti Narayan
2. Higher Engineering Mathematics: Dr. B. S. Grewal
3. Applied Mathematics: Ch. V. Ramana Murthy and N.C. Srinivas
4. Advanced Engineering Mathematics: Erwin Kreysig

2.2 APPLIED SCIENCES-II

Total no of Lectures per Week : 04 hours
Practicals per week : 02 hours
Durations of Semester end examination : 03 hours
Maximum marks for semester end examination: 100, Section I (50), Section II (50)
Maximum marks for internal assessment : Total 50, Section I (20+ 5) & Section II (20+5)
Total Marks : 150
No. of Sections : 2

The question paper will consist of 8 questions divided into two sections, Total of 4 questions are to be attempted, answering 1 question from each module, each question will carry 25 marks. There shall be 2 questions from each module.

SECTION – I (APPLIED PHYSICS)

MODULE – I

LASERS:

Interaction of radiation with matter from quantum mechanical view, Absorption, Spontaneous and stimulated emission of radiation, Active medium, metastable state, population inversion, non–equilibrium state, pumping, Conditions for light amplification, Einstein's theory of stimulated emission, Operating principle of a laser, pumping–schemes, Optical resonator, Properties of laser, He–Ne laser, Ruby Laser, applications (9hrs)

FIBRE OPTICS:

Total internal reflection, propagation of light in optical fibre, structure of an optical fibre and fibre cable, acceptance angle and cone, Numerical aperture of an optical fibre, Types of optical fibres, Modes of propagation, single and multimode fibres, frequency or V-number of fibre ,Applications-Fibre optic communication and Fibrescope (6hrs)

MODULE – II

MODERN PHYSICS:

Compton Effect, wave nature of particle, de Broglie hypothesis, Davison Germer experiment (5 hrs)

X-rays- Continuous and characteristic x-ray spectra, Moseley's law, X-Ray diffraction-Bragg's spectrometer. (5 hrs)

Super conductors-Meissner effect, type-I and II, high Tc superconductors, BCS theory (qualitative analysis only) properties and applications.

SECTION – II (APPLIED CHEMISTRY)

HIGH POLYMERS

Definition, classification – Natural and synthetic with examples. Polymerization – definition, types of polymerization – free radical mechanism (ethylene as an example), Methods of polymerization – bulk solution, suspension and emulsion polymerization. Glass transition temperature, structure and property relationship. Compounding of resins, synthesis properties and applications of Teflon, PMMA, polymethane and phenol – formaldehyde resin. Elastomers – Deficiencies of natural rubber and advantages of synthetic rubber. Synthesis and application of Neoprene, Butyl rubber. Adhesives – Manufacture and application of Epoxy resins. Conducting polymers – definition, mechanism of conduction in polyacetylene, structure and applications of conducting polyaniline.
(8 Hrs)

CHEMICAL ENERGY SOURCES

Introduction to energy: Fuels – definition, classification, importance of hydrocarbon as fuels, calorific value definition, Gross and net calorific values. Determination of calorific value of solid/liquid fuel using bomb calorimeter. Petroleum cracking - fluidized catalytic cracking, Reformation of petrol. Knocking-mechanism, octane number, cetane number, prevention of knocking, antiknocking agents, unleaded petrol, synthetic petrol – Berguis process and Fischer Tropsch process, power alcohol.

Solar Energy Photovoltaic cells – Introduction, definition, importance, working of a PV cell, solar grade silicon, physical and chemical properties of silicon relevant to photovoltaics, production of solar grade (crystalline) silicon and doping of silicon. (7 Hrs)

MODULE IV

WATER TECHNOLOGY

Impurities in water, water analysis – Determination of different constituents in water. Hardness, Alkalinity, chloride, Fluoride, Nitrate, Sulphate and dissolved oxygen. Numerical problems on hardness and alkalinity. Biochemical oxygen demand and chemical oxygen demand, Numerical problems on BOD and COD. Sewage treatment. Potable water, purification of water – Flash evaporation, Electro dialysis and Reverse osmosis. Hazardous chemicals with ill effects. (8 Hrs)

LIQUID CRYSTALS AND THEIR APPLICATIONS

Introduction, classification. Thermotropic and lyotropic with examples. Types of mesophases, nematic, chiral nematic (cholestric), smectic and columnar. Homologues series (PAA and MBBA), Applications of liquid crystals in display systems.

Instrumental methods of analysis

Theory, Instrumentation and Applications of colorimetry, potentiometry, conductometry (7 Hrs)

EXPERIMENTS IN APPLIED PHYSICS

1. Thermistor characteristics
2. Hall effect
3. e/m by Thomson method
4. Velocity of Ultrasonic wave
5. Energy gap of a semiconductor
6. Planck's constant by photocell
7. He-Ne Laser/Diode Laser

NOTE: Minimum of 4 experiments have to be completed per semester.

EXPERIMENTS IN APPLIED CHEMISTRY

1. Determination of total hardness of a sample of water using disodium salt of EDTA.
2. Determination of Calcium oxide (CaO) in the given sample of cement by Rapid EDTA method.
3. Determination of percentage of copper in brass using standard sodium thiosulphate solution.
4. Determination of Iron in the given sample of Haematite ore solution using potassium dichromate crystals by external indication method
5. Determination of chemical oxygen demand (COD) of the given industrial waste water sample.
6. Determination of dissolved oxygen in the given sample by winkler method.

Reference

1. Vogels text book of quantitative inorganic analysis, revised by J. Bassett, R. C. Denny, G.H. Jeffary, 4th Ed.
2. Practical Engineering Chemistry by Sunita & Ratan.

APPLIED PHYSICS

Text books

1. Applied Physics – V R Doiphode
2. Engineering Physics – Uma Mukherji
3. Applied Physics – Patgaonkar

Reference books

1. Engineering Physics – Gaur And Gupta
2. Engineering Physics – M.N. Avadhanulu P.G. Kshirsagar
3. Engineering Physics – A.S.Vasudev

APPLIED CHEMISTRY

Text Books

1. A text book of Engineering chemistry by Jain and Jain Dhanapatrai Publications, New Delhi.
2. Engineering chemistry by M. M. Uppal, Khanna Publishers, Sixth Edition, 2001.

Reference books

1. Principles of Physical chemistry B. R. Puri, L. R. Sharma & M. S. Pathama, S. Nagin Chand & Co.
2. Text book of polymer Science by F. W. Billmeyer, John Wiley & sons, 1994
3. Liquid crystals and plastic crystals, Vol –I, edited by G. W. Gray and P. A. Winsor, Ellis Horwood series in Physical chemistry, New York.
4. Corrosion Engineering – by M. G. Fontana, Mc Graw Hill Publications.
5. A text book of Engineering chemistry by S. S. Dara, S. Chand Publications, New edition.

2.3 INFORMATION TECHNOLOGY

Lectures per week	: 4 hours
Practical per week	: 2 hours
Max. Marks for the paper	: 100
Max. Marks for Sessional	: 20 + 5
Duration of Theory Paper	: 3 hours
Total no. of modules	: 4
Questions to be drawn from each module	: 2

Min. No. of questions to be answered from each module: 1
Total no of questions to be answered in the paper : 5

MODULE I

Introduction to Computer: Specifications of Personal Computer (Pentium Based Computer), Anatomy of digital computer, Memory Units, Auxiliary storage units.
Input devices: Keyboard, mouse
Output Devices: Monitor: characteristics of monitor, Printers: Dot matrix, Inkjet printers
Operating Systems: Functions of an operating system, salient features and elementary operations with DOS, Windows and Linux.
Networks of computers:
Topologies
Network Architecture: Peer to peer, Client-Server architecture
Internet and World Wide Web: Domain Name, IP Address, URL, WWW, Web Browsers.
Email: How Email works, Email names and addresses, Spamming

MODULE II

Database Management System:
Introduction to Database Management System: What is database, Characteristic of data in database, Types of database management systems.
Introduction to Programming languages: Introduction, Machine languages, Assembly languages, High level languages, types of high level languages. Functions of an assembler, interpreter and compilers, Compilation process.

Fundamental algorithms along with their Flow charts:
- Exchange of values of two variables
- Summation of set of numbers
- Factorial Computation
- Fibonacci Series
- Reversing the digits of an Integer

MODULE III

Fundamentals of Programming using C Language:
Overview of C, Constants variables and data types, operators and expressions, data input output, Decision making and looping: If, If-else, while, do-while, for, switch.

MODULE IV

Functions: Function declarations and prototypes, Call by value, Call by reference.
Arrays: Introduction, One dimension array, two dimension array, array initialization, Passing array to a function.
File Input Output Operations: File management in C, Defining opening and closing of files.

TEXT BOOKS:

1. Fundamentals of Information technology by Alexis Leon (Module I and II)
2. How to solve it by computers by R.G Dromey(Module II)
3. Programming in ANSI C by Balagurusamy (Module III and IV)
4. Let Us C by Yeshwant Kanetkar (Module IV)

Experiments:

1) Components of PC and Network Components
2) Commands of DOS and Linux
3) Study of MS Word and Powerpoint
4) Study of MS Access and MS Excel
5) C program on Decision control structure
6) C program on Loop control structure
7) C program on Case control structure
8) C program on Functions
9) C program on Arrays
10) C program on Files

2.4 BASIC MECHANICAL ENGINEERING

Total no. of lectures per week	: 03 Hours
Practicals per week	: 02 Hours
Duration of semester end examination	: 03 hours
Maximum marks for semester end examination	: 100
Maximum marks for internal assessment	: 20 + 5
Total marks	: 125

Semester end examination is of 100 marks and the question paper consists of 4 modules and 8 questions. Each module carries 2 questions of 20 marks each. Out of this, 5 questions are to be attempted, choosing at least one from each module.

MODULE I

BASICS OF THERMODYNAMICS

Basic concepts of thermodynamics – system, surroundings, property, process, heat and work (concepts only); First law-Non-Flow Energy equation (no proof) with the concept of internal energy and enthalpy; Reversible process - constant volume, constant pressure, isothermal and adiabatic only (restricted to basic calculations of heat and work transfer); First law applied to boiler, turbine, condenser and pump; Second law and degradation of energy, absolute temperature scale (concepts only); Air standard cycle (representation on P-V plane only)- Otto and Diesel cycle only (no derivation)- efficiency –definition, basic calculation

MODULE II

BASICS OF HEAT ENGINES AND REFRIGERATION

Internal Combustion (I.C) Engines: Basics- definition, taxonomy – Spark Ignition & Compression Ignition with two-stroke and four stroke - operating principles with basic parts, Systems - fuel, ignition, lubrication and cooling (elementary description with schematic sketches only)- basic calculations of brake power and specific fuel consumption, introduction to Multi-Point Fuel Injection (MPFI)

Thermal power plant – Working principle using schematic diagram; Steam Engineering – latent heat, dryness fraction (no steam table and Mollier diagram); Vapour power cycle - basic Rankine cycle only (preliminary treatment without numericals)

Refrigeration- Basics, refrigerants, working principle using schematic diagram, domestic refrigerator - tonne of refrigeration (preliminary treatment without numericals)

MODULE III

BASICS OF AUTOMOBILE ENGINEERING

Preamble, Components - basic structure, transmission-working principle of single plate clutch, gear box-construction and working principle of constant mesh gear box, universal joint, propeller shaft, differential - construction and working principle; brake system – lay out for air and power brake systems with working principles; Steering system - lay out for manual and hydraulic steering systems with working principles; Classification of automobiles; Automotive emissions and control – basic concepts only

MODULE IV

INTRODUCTION TO MANUFACTURING ENGINEERING- (BRIEF TREATMENT)

Casting – sand, die, centrifugal; Rolling – flat, shape; Forging-open die, closed die; Extrusion and drawing-hot, cold, impact, hydrostatic; Sheet metal forming processes - bending, tube bending, stretch forming, spinning; Machining processes to produce various shapes-turning, drilling, milling, tapping, grinding, relative motion between work piece and tool for each process; Joining processes-arc welding, laser-beam welding, brazing, soldering, adhesive bonding, mechanical fastening.

TEXT BOOKS:

1. Rathakrishnan E. (2003), Fundamental of Engineering Thermodynamics, Prentice Hall of India Pub., New Delhi.
2. Singh K. (1994), Automobile Engineering, Standard Publishers, New Delhi.
3. Campbell J. S. (1985) Principles of manufacturing materials and processes, Tata McGraw Hill Pub., New Delhi.
4. Palanichamy M.S. (1991), "Basic Civil & Mechanical Engineering", Tata McGraw Hill Pub., New Delhi.

REFERENCE BOOKS:

1. Venugopal K. (1997), Basic Mechanical Engineering, Anuradha Publishers, Chennai
2. Crouse. (2004), Automotive mechanics, Tata McGraw Hill Pub., New Delhi.
3. Cengel Y. A., Boles M. A. (2002), Thermodynamics - an Engineering approach, Tata McGraw Hill Pub., New Delhi.
4. Rao P. N. (2001), Manufacturing Technology, Tata McGraw Hill Pub., New Delhi.
5. Kalpakjian S. and Schmid S. R. (2000), Manufacturing Engineering and Technology, Addison Wesley Longman Pub., Singapore

2.5 BASIC ELECTRONIC ENGINEERING

Total no. of lectures per week	: 03 Hours
Practicals per week	: 02 Hours
Duration of semester end examination	: 03 Hours
Maximum marks for semester end examination	: 100
Maximum marks for internal assessment	: 20 + 5
Total marks	: 125

Semester end examination is of 100 marks and the question paper consists of 4 modules and 8 questions. Each module carries 2 questions of 20 marks each. Out of this, 5 questions are to be attempted, choosing at least one from each module.

MODULE I

SEMICONDUCTOR DIODES: Ideal Diode; Semiconductor Diode; Resistance Levels; Diode Equivalent Circuits; Transition and Diffusion Capacitance; Effect of temperature; Avalanche Breakdown. DIODE APPLICATIONS: Load Line Analysis; Diode Approximations; Series, Parallel and Series-Parallel Diode Configurations; Half-wave, Full-wave and Bridge Rectifiers; PIV; DC and r.m.s. voltages, Derivation of Ripple Factor, Transformer Utilization Factor; Basic Concept of a Capacitor-filter; Voltage Regulation; Zener diodes ; Clippers; Clampers; Voltage Multiplier Circuits.

MODULE II

BIPOLAR JUNCTION TRANSISTOR(BJT): Transistor Construction; Transistor Operation; Common-Base Configuration; Transistor Amplifying Action; Common-Emitter Configuration; Common-Collector Configuration; Limits of Operation.

DC BIASING: Operating Point; Fixed-Bias Circuit; Emitter-Stabilized Bias Circuit; Voltage-Divider Bias; Transistor Switching Networks; Bias Stabilization (Fixed Bias, Emitter-Bias and Voltage-Divider Bias).

MODULE III

FIELD-EFFECT TRANSISTORS: Construction and Characteristics of JFETs; Transfer Characteristics; Depletion-Type MOSFET; Enhancement-Type MOSFET; CMOS. FET BIASING: (JFETs and Depletion –type FET) -Fixed-Bias, Self-Bias and Voltage-Divider Bias Configurations (both n- and p-channel); Enhancement-Type MOSFETs-Feedback Biasing Arrangement, Voltage – Divider Biasing Arrangement.

MODULE IV

DISCRETE AND IC MANUFACTURING TECHNIQUES: Discrete Diodes; Transistor Fabrication; Integrated Circuits; Monolithic Integrated Circuit.
OPERATIONAL AMPLIFIERS: Introduction.
FEEDBACK AND OSCILLATOR CIRCUITS: Feedback Concepts; Feedback Amplifier-Phase and Frequency Considerations; Oscillator Operation.
OTHER TWO-TERMINAL DEVICES: Photodiodes; Photoconductive Cells; IR Emitters; Liquid-Crystal Displays; Solar Cells; Thermistors.
pnpn AND OTHER DEVICES. Silicon- Controlled Rectifier (SCR); Basic SCR Operation; SCR Characteristics and Ratings.
OSCILLOSCOPE (CRO): Cathode Ray Tube- Theory and Construction; CRO-Operation; Voltage Sweep Operation; Synchronization and Triggering.

SESSIONALS:
1. Eight Assigments to cover the syllabus.
2. A minimum of six experiments based on the syllabus.

TEXT BOOKS:

1. R. Boylestad and L. Nashelsky, Electronic Devices and Circuits, 6th Edn. PHI.
2. A. Mottershead, Electronic Devices and Circuits PHI.

REFERENCES:

1. N.N.Bhargava., Basic Electronics and Linear Circuits, Tata McGraw-Hill.

2.6 ENVIRONMENTAL AND SOCIAL SCIENCES

Total no. of lectures per week	: 04 Hours (2+2)
Duration of semester end examination	: 03 hours
Maximum marks for semester end examination	: 100, Section I (50), Section II (50)
Maximum marks for internal assessment	: Total 50, Section I (20+ 5) & Section II(20+5)
Total marks	: 150
No. of sections	: 02

The question paper will consist of 8 questions divided into two sections, Total of 4 questions are to be attempted, answering 1 question from each module, each question will carry 25 marks. There shall be 2 questions from each module.

SECTION – I
ENVIRONMENTAL SCIENCES

MODULE-I

The Environment: Definition, scope, nature and its importance. Need for public awareness.

Natural Resources and Associated Problems

a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources: Usage and exploitation, environmental effects of extracting and using mineral resources.

d) Food resources: World food problem, changes caused by agriculture effects of modern agriculture, fertilizer-pesticide problems.

e) Energy resources: Growing energy needs, renewable and non renewable energy sources, need for conservation of energy, use of alternate energy sources.

f) Land resources: Land as a resource, its degradation, man induced land-slides, soil erosion and desertification.

g) Role of an individual in conservation of natural resources

h) Equitable use of resources for sustainable lifestyle.

Ecosystems: Concept, structure and function of an ecosystem, producers, consumers and decomposers. Food chains, food webs and ecological pyramids.
Introduction, types, characteristics features, structure and function of the following ecosystems
A) Grassland ecosystem,
B) Pond ecosystem

MODULE-II

Environmental Pollution: Definition, causes, effects and control measures of:
a) Air pollution b) Water pollution d) Marine pollution e) Noise pollution.
Solid waste management: Causes, effects and control measures of urban and industrial wastes.
Global Issues: Acid rain, Ozone layer depletion and Global warming.

Social Issues and the Environment

From unsustainable to sustainable development, urban problems related to pollution, water conservation, rain water harvesting

Functions of CPCB and SPCB

SECTION – II
SOCIAL SCIENCES

MODULE- III

Personality: Types (Heredity + Environment Tolerance)

1. Personality and Motivation
2. Coping with Stress- Repetitive Prayer, Meditation, yoga
3. Adjustment
4. Positive thinking and Positive Living: balanced diet, proper habits and healthy living
5. Personal Grooming

Inter-Group Relations

1. Inter-Personal Relations and Inter- Group relations (working as a team, cooperation and competition)
2. Empowerment of Women
3. Responsibility: Personal, Moral and Social
4. Business Manners- Etiquettes and Social behaviour

MODULE- IV

Society and Culture

1. Education- Nature and Significance, Limitations and Evaluation, different kinds of education systems
2. Ethics: Moral foundations of social order Professional ethics
3. Our Culture: different aspects
4. Culture and Identity
5. Changes in culture: Cross cultural interactions, Acculturation, enculturation, cultural diffusion etc.
6. Globalisation
7. Religious Tolerance

TEXT BOOKS:

Environmental Studies

1. A Basic Course in Environmental Studies by S. Deswal, Publisher: Dhanpat Rai and Co. Pvt. Ltd.
2. Principles of Environmental Science and Engineering by R. Pannirselvam SPGS Publisher, Chennai.

Social Sciences

1. Psychology, Robert A. Baron, Pearson Education Pte. Ltd.
2. Sociology (Principles of Sociology with an Introduction to social thought), C. N. Shankar Rao, S. Chand Publications.

References: Environmental Studies

1. De A. K., Environmental Chemistry, Wiley Eastern Ltd.
2. Desh Ka Paryavaran - Anupam Misra, Ganolai santi Pratisthan. New Delhi.

3. Down to Earth, Centre for Science and Environment
4. Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
5. Mckinney, M. L. & Schocl. R. M. 1996, Environmental Science Systems
6. Odum, E. P. 1971, Fundamentals of Ecology, W. B. Saunders Co. USA,
7. Rao M. N. & Datta, A. K. 1987, Waste Water Treatment, Oxford & IBH Publ.Co.
8. Sharma B. K., 2001, Environmental Chemistry, Goel Publ. House, Meerut Society, Bombay (R)
9. Trivedi R. K. and P. K. Goel, Introduction to air pollution, Techno-Science
10. Trivedi R. K., Handbook of Environmental Laws, Rules, Guidelines, Compliances

References: Social Sciences

Sociology, Richard T. Schaefer and Robert P. Lamm, Tata Mcgraw Hill publications
Articles in relevant Journals/Publications
The New Encyclopedia Britannica, Macropedia.

2.7 WORKSHOP PRACTICE – II

Practicals per week : 04 Hours

Maximum marks for internal assessment : 50

i) **WELDING:-**Demonstration of various welding machines and equipments.

Practical: At least one job on Electric Arc welding.

ii) **TURNING: -** Demonstration of lathes, tools and equipments. Demonstration of drilling machines, grinding machines, shapers, and milling machines.

Practical: At least one job on lathe covering simple lathe operations.

iii) **PATTERN MAKING: -** Timber classification, seasoning defects in Timber, Knowledge of plywood, hardwood, adhesive glues, paints, varnish, and polish.

Practical: At least one simple pattern of wood.

iv) **FOUNDRY: -** Demonstration of hand tools, equipments, and furnaces used in foundry shop.

Practical: At least four various types of sand moulds.

IT 3.1 APPLIED MATHEMATICS – III

Lecture Per week	: (3+ 1+ 0)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Linear Algebra: Types of Matrices, Determinants, Adjoint inverse of Matrices, Elementary transformation, rank using elementary transformation, Canonical and normal form, system of equations $AX = B$ and $AX = 0$, linearly independent systems. (6 Hrs)

Eigen values, Eigen vectors, properties, similar Matrices, Cayley Hamilton theorem, Applications, Minimal polynomial, Diagonalization, function of Matrices (5 Hrs)

MODULE 2

Z-Transforms, Inverse, convolution, properties, Applications. (4Hrs)

Probability: Classical definition, Axiomatic definition, Sample space, events, Independent events, Conditional probability, theorem of total probability, Baye's theorem of probability. (7Hrs)

MODULE 3

Random variables: Discrete and Continuous distribution, density function, Marginal and conditional distribution, Stochastic independence. (4 Hrs)

Discrete probability distribution: Binomial, Multinomial, Poisson, Geometric and Hypergeometric. Continuous probability distribution: Uniform, exponential, Normal and Gamma. (4 Hrs)

Expectation: Expectation of function, Variance, moment generating function, Characteristic function. (4 Hrs)

MODULE 4

Laplace Transforms, inverse, properties, convolution and application. (6Hrs)

Fourier Transforms, Inverse , convolution, properties, applications. (5Hrs)

TEXT BOOKS:

1. Applied Mathematics –III-By R. M. Baphana Technova Publication
2. Engineering Mathematics (for semester III) by T Veerajan, Tata MCGraw-Hill Publishing Company
3. Engineering Mathematics Voll-III P. Kandasamy S.Chand &Company

REFERENCE BOOKS:

1. A First Course in Probability by Ross. S, Collian Mac Millan, NewYork.
2. Probability and Statistics in engineering and Management Science by William W. Hines, John Wiley and Sons Publications
3. Advanced Engineering Mathematics by Kreyazig.
4. A Text Book of Matrices by Shanti Narayan, S. Chand and Company
5. Engineering Mathematics by C. N. Tembhekar & P.D.Shobhane, Das Ganu Prakashan
6. Theory and Problems in Matrices, Schaum outline series.
7. Engineering Mathematics, Vol. I & II, S.Chand and Company.
8. Theory & Problems of Probability and statistics by Murray R. Spiegel, Schaums outline series.

9. Introduction to Probability and Statistics by Seymour Lipschutz, Schaums outline series.

IT 3.2 NUMERICAL METHODS

Lecture Per week	: (3+ 0+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Introduction to Numerical Computing (3 Hrs)
Introduction, Numeric data, Analog computing, Digital computing, Process of numerical computing, Characteristics of Numerical computing, computational environment.

Approximations and Errors in Computing (3 Hrs)
Inherent errors, Numerical Errors, Absolute and Relative errors, Convergence of Iterative Processes

Solutions of Non-linear equations (3 Hrs)
Bisection Method, False Position Method, Newton Raphson, Secant method,

Direct solution of Linear Equations (3 Hrs)
Solution by Elimination, Basic Gauss Elimination method, Gauss Elimination with pivoting, Gauss – Jordan method

MODULE 2

Iterative Solutions of Linear Equations (3 Hrs)
Jacobi iteration method, Gauss Seidel method, Method of relaxation, convergence of iteration methods.

Interpolation (5 Hrs)
Linear Interpolation, Lagranges Interpolation Polynomial, Newton's Interpolation Polynomial, Divided difference table, Interpolation with Equidistant points.

Regression (3 Hrs)
Fitting Linear Equations, Fitting transcendental equations, Fitting polynomial function

MODULE 3

Numerical differentiation (5 Hrs)
Differentiating Continuous Functions, Differentiating Tabulated functions, difference tables, Richardson Extrapolation

Numerical Integration (6 Hrs)
Trapezoidal Rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Romberg Integration

MODULE 4

Numerical Solution of Ordinary Differential equations (6 Hrs)
Taylor Series Method, Euler's methods, Heun's Method, Polygon Method, Runge-Kutta methods

Numerical Solution of Partial Differential Equations (5 Hrs)
Deriving differential Equations, Elliptic Equations, Parabolic Equations, Hyperbolic Equations

TEXT BOOKS:

1. Numerical Methods by E. Balaguruswamy, Tata Mc Graw Hill.
2. Introductory Methods of Numerical Analysis by S. S. Shastry, PHI

REFERENCE BOOKS:

1. Numerical Algorithms by E.V. Krishnamurthy and Sen, PHI
2. Computer Oriented Numerical Techniques by Rajaraman, PHI

3. Numerical Methods in Engineering and Science by B.S. Grewal, Khanna Publications.

IT 3.3 ANALOG AND DIGITAL CIRCUITS

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Number Systems and Codes1Conversions (binary to decimal and decimal to binary), Octal and hexadecimal numbers, Codes (ASCII, Excess-3, Gray), Error detection and correction codes.
Arithmetic Circuits Binary Addition & Subtraction, Unsigned binary numbers, 2's Complement Representation & Arithmetic, Adder-Subtracter. (4 Hrs)

Digital Logic: Binary Numbers, basic gates, Boolean algebra, Nor and Nand Gates, And or Invert Gates, De Morgan's theorem, Positive and Negative Logic. (3 Hrs)

Combination Logic Circuits Boolean laws/theorems, Sum of Products, Truth table, Pairs, Quads, and Octets, Karnagh mapping, Product of Sums Method and Simplification.
Data Processing Circuits Multiplexers, Demultiplexers, decoder, BCD to decimal decoder, 7-segmant decoder, encoders. (4 Hrs)

MODULE 2

Flip-Flops RS Flip-Flops, Gated Flip-Flops, Edge-Triggered RS, D, and JK Flip-Flops, Flip-Flop timing, JK Master-Slave Flip-Flops (4 Hrs)

Registers Types of Registers, Serial in-serial out, Serial in-parallel out, Parallel in-serial out, Parallel in-parallel out, Ring counters (3 Hrs)

Counters Asynchronous counters, Synchronous counters, changing the counter modulus, decade, and shift counters, A MOD-10 shift counter with decoding. D/A and A/D conversion Asynchronous counters, Synchronous counters, changing the counter modulus, decade, and shift counters, A MOD-10 shift counter . (4 Hrs)

MODULE 3

Op-amp – ideal characteristics – op-amp-as inverting amplifier – op-amp.as non-inverting amplifier – input offset voltage – input offset current – slew rate – Application – adder, subtractor, integrator, differentiator – unity gain buffer – comparator . Opamp as waveform generators. (5 Hrs)

Feed back amplifiers – types of feedback – gain with negative feedback – stability of gain – reduction of distortion – effect of feedback on input and output resistance – emitter follower – current series feedback amplifier – differential amplifier – differential mode gain of a differential amplifier – common mode gain – CMRR. (6 Hrs)

MODULE 4

Clocks and Timing Circuits Clock waveforms, TTL clock, Schmitt Trigger, 555 Timers (Astable, Monostable), Monostables with input logic. (6 Hrs)

Oscillators – Barkhansen criterion for oscillation – Hartley oscillator – Colpits' oscillator – phase shift oscillator astable multivibrator – Piezoelectric crystals – crystal oscillator. (6 Hrs)

Voltage Regulators: Definition, design and letter using IC 723. (6 Hrs)

TEXT BOOK S:

1. Modern Digital Electronics – R.P. Jain, II Edn., TMH.
2. OpAmps & Linear Integrated Circuits – Ramakant A. Gayakwad, II Edn., PHI

REFERENCE BOOKS

1. Digital Principles and Applications – A.P. Malvino, Donald P. Leach IV Edn, TMH
2. Digital Computer Electronics – Malvino II Edn., TMH
3. Microelectronics – Jacob Milliman, TMH
4. Integrated Electronics: Analog and Digital Electronic Circuits and Systems – MIllman and Halkias, TMH.
5. Electronics for Scientist & Engineers – Vishwanathan, Mehta and Rajaraman, PHI.
6. Digital Principles & Applications – Malvino & Leach, PHI
7. Microelectronics – Jacob Millman, Arvin GRabel, II Edn., MGH

IT 3.4 COMPUTER ORGANISATION AND ARCHITECTURE

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE 1

(I) Introduction to Computer Organization (1 Hr)

Computer System Organization
- Computer components
- Functions
- Interconnection Structure

(II) **Computer Architecture** (1 Hr)

1) Integer Representation
- Unsigned Numbers
- Signed Numbers
  - Signed Magnitude
  - 2's Complement
  - Biased Representation

2) **Integer Arithmetic** (3 Hrs)
- Negation
- Addition
- Subtraction
- Multiplication
  - Unsigned
  - Signed (Booth's Algorithm)
- Division
  - Unsigned
  - Signed

3) **Floating Point Representation** (1 Hrs)
- IEEE 32 bits, 64 bits

4) **Floating Point Arithmetic** (3 Hrs)
- Adition
- Subtraction
- Multiplication
- Division
- Accurate Arithmetic
  - Guard bits
  - Rounding

(III) **Instruction Set** (2 Hrs)

1) Elements of Machine Instructions
2) Representation of Instructions
3) Types of Instructions
4) Number of Addresses (Instruction Formats)
5) Types of Operands
6) Addressing Modes

MODULE II

I) **Semiconductor Memory** (4 Hrs)
- 1) Memory Hierarchy
- 2) Characteristics of Memory System
- 3) Semiconductor RAM Memories
  - Internal Organization of Memory Chip
  - Static RAM
  - Asynchronous DRAM
  - Synchronous DRAM
  - Connection of Memory to the processor
  - RAM Bus memory
  - ROM
  - PROM
  - EPROM
  - EEPROM
  - Flash Memory
  - Error Correction

II) **Cache Memory** (1 Hr)
- 1) Basics of Cache
  - Structure
  - Read operation
- 2) Elements of Cache Design

III) **Associative Memory** (2 Hrs)
- 1) Working principle
- 2) Associative memory cell and array

IV) **External Memory** (3 Hrs)
- 1) Magnetic Disk
  - Floppy
  - Hard Disk
  - Read/Write Mechanism
  - Physical Characteristics
  - Disk performance parameters
- 2) Magnetic Tape
- 3) Optical Memory
  - CD
  - CD-R
  - CD-RW
  - DVD-R
  - DVD-ROM
- 4) RAID

V) **Memory Organization and Interleaving** (1/2 Hr)

VI) **Virtual Memory** (1 ½ Hrs)
- 1) Logical versus physical address space
- 2) Working principle
- 3) Mapping Functions
- 4) Replacement policy

MODULE III

1) **Input/Output** (4 Hrs)
- External Devices
- I/O Modules
- Programmed I/O
- Interrupt Driven I/O (Interrupt Controller and PPI)
- Direct Memory Access (DMA Controller)
- I/O Channel and Processor

2) **Asynchronous Data Transfer** (2 Hrs)
- Strobe Control
- Handshaking
- Asynchronous Serial Transfer
- Asynchronous Communication Interface

3) **CPU Structure and Functions** (5 Hrs)
1) Processor Organization
2) Register Organization
3) CPU performance and its factors
4) Instruction Pipeline
- Basic Concepts of Pipelining
- Pipeline Performance
- Pipeline Hazards
  - Structural Hazards
  - Data Hazards
  - Control Hazards

5) Dealing with branches

4) Introduction to HyperThreaded Processors and Dual core Processors

MODULE IV

1) **Buses** (2 Hrs)
- Bus interconnection
  - VGA
- Asynchronous v/s Synchronous Buses
- PCI Bus
- SCSI
- USB

2) **CISC , RISC** (2 Hrs)
- Architecture
- Characteristics
- Pipelining
- Overlapped Register Window Concept
- Compiler based Register Organization
- Examples

3)**Multiprocessors** (3 Hrs)
- Characteristics of multiprocessors
- Types of Parallel Processor
- Interconnection structures
- Interprocessor arbitration
- Cache Coherence
- Multiprogramming v/s Multiprocessing
- Symmetric Multiprocessor

4) **Control Unit** (2 Hrs)
1) Micro Operations
2) Control of the Processor

5) **Hardwired** (1 hr)
   1) Hardwired Control
   2) Complete Processor

6) **Micro programmed Control Unit** (1 hr)
   1) Horizontal v/s Vertical microinstructions
   2) Control Memory
   3) Micro programmed control unit

4) Micro instruction sequencing and execution

TEXT BOOKS:

1. Computer Organization And Architecture. Edition VI By William Stallings
2. Computer Organisation and ArchitecturE By M. Morris Mano
3. Computer Organization. Edition V By Carl Hamacher, Zvonko Vranesic, Safal Zaky

REFERENCE BOOKS:

1. Computer Organisation And Design. Edition III By David A. Patterson, John L. Hennesy
2. Computer Organization. Edition V By Carl Hamacher, Zvonko Vranesic, Safal Zaky
3. How Computers Work By Ron White, Timothy Edward Downs
4. Computer organization and Design Edition II By P. Pal Chaudhauri

IT 3.5 DATA STRUCTURES USING C

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max Marks for Practical	: 50
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE 1

Overview of C Programming: Control structures, Strings, Functions (2 Hrs)
Storage classes and preprocessors, **Pointers:** Initializing pointers, Pointer arithmetic, Pointers and function arguments, Pointer to function, Pointers and arrays, Pointers and string, Array of pointers, Pointers to pointer, Memory allocation in C (3 Hrs)
Structures: Structures and functions, Array of structures, Nested Structures, Structures and pointers, Copy structure (2 Hrs)
Unions, User define data type (typedef), enumerated data type, bit fields, symbolic constants, use of structures (2 Hrs)
Files: Working with strings, Formatted input and output with strings, Error while reading a file, Stdin, Stdout, Stderr pointers, Functions: rewind, ftell, fflush, fseek, Erasing files.(2 Hrs)

MODULE II

Introduction to Data representation and Data Structures: **Arrays**: Representation of arrays and their applications (2 Hrs)
Stacks: Representation of stacks and its applications, **Recursion** (4 Hrs)
Queues: Representation of queues and its applications, Circular queues, Priority queues. (3 Hrs)
List: Singly linked list, doubly linked list, circular linked list, linked stacks and queues, and its applications. (3 Hrs)

MODULE III

Trees: Basic terminology, binary trees and their representations, traversals of trees, applications of trees, B-tree, AVL. (5 Hrs)
Graphs: Basic terminology, representation of graphs, directed and undirected graphs and their traversals, depth first and breadth first search, spanning trees. Applications of graphs**:** shortest path problem, topological sorting, matching. (6 Hrs)

MODULE IV

Sorting: Basic concept, Exchange sort, Insertion sort, Selection sort, Exchange sort, Merge sort, Radix sort, Heaps and Heap sort. (6 Hrs)

Searching: Basic searching techniques, sequential and binary search, tree searching. **Hashing:** Hash function, collision handling mechanisms. (5 Hrs)

TEXT BOOKS:

1. Data Structures and Algorithms by Alfred V. Aho, John E. Hopcroft & J. D. Ullman, Addison Wesley
2. Data Structures using C & C++ by Yedidyah Langson, Moshej Augenstein, Aaron M. Tenenbaum, Prentice Hall of India
3. Data Structures and Program Design in C by Robert L. Kruse, PHI
4. Fundmentals of Computers and Programming in C, a practical approach by G. S. Baluja and G. K. Baluja publisher: Dhanapat Rai & Co.

REFERENCE BOOKS:

1. Fundamentals of Data Structures by Ellis Horowitz and Sartaj Sahni, Galgotia Publications
2. An introduction to data structures with applications by Jean Paul Tremblay and Paul G. Sorenson – Tata McGrawHill
3. Fundamentals of Computer Algorithms by Ellis Horowitz and Sartaj Sahni – Galgotia Publications

IT 3.6 SYSTEM ANALYSIS AND DESIGN

Lecture Per week : (3+ 1+ 2)
Max Marks for Theory paper : 100
Max Marks for Practical : 50
Max marks for sessionals : 20 + 5
Duration of Paper : 3 hours
Total Number of Modules : 4
Number of Questions from Each Module : 2 (Each question shall carry 20marks)
Total Number of Questions to be answered : 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

Systems Concepts and the Information Systems Environment (3 Hrs)
Introduction. The Systems Concept: Definition. Characteristics of a System: Organization. Interaction. Interdependence. Integration. Central Objective. Elements of a Systems : Outputs and Inputs. Processor(s). Controls. Feedback. Environment. Boundaries and Interface. Types of Systems: Physical or Abstract Systems. Open or Closed Systems. Man-Made Information. Systems. Illustration-A Dynamic Personnel Information System Model

The System Development Life Cycle (4 Hrs)
Introduction. The Systems Development Life Cycle: Recognition of Need-What Is the Problem? Feasibility Study. Analysis. Design. Implementation. Post-Implementation and Maintenance. Considerations for Candidate Systems: Political Considerations. Planning and Control for System Success. Prototyping.

The Role of the Systems Analyst (4 Hrs)
Introduction. Definition. Historical Perspective: The Early Years. The War Effort. What Does It Take to Do Systems Analysis? Academic and Personal Qualifications. The Multifaceted Role of the Analyst: Change Agent. Investigator and Monitor. Architect. Psychologist. Salesperson. Motivator. Politician. The Analyst/User Interface: Behavioral Issues. Conflict Resolution. The Place of the Analyst in the MIS Organization: The MIS Organization. Rising Positions in System Development: The Paraprofessional. The Technical Writer. Conclusions.

MODULE II

Systems Planning and the Initials Investigation (3 Hrs)
Introduction. Bases for Planning in Systems Analysis: Dimensions of Planning. Initial Investigation: Needs Identification. Determining the Users Information Requirements. Case Scenario. Problem Definition and Project Initiation. Background Analysis. Fact Analysis. Determination of Feasibility.

Information Gathering (2 Hrs)
Introduction. What Kinds OF Information Do We Need? Information about User Staff. Information about Work Flow. Where does Information Originate? Information-Gathering. Tools: Review of Literature, Procedure, & Forms. On-Site Observation. Interviews & Questionnaires. Types of Interview and Questionnaires

The Tools Of Structured Analysis (2 Hrs)
Introduction. What is Structured Analysis? The Tools of Structured Analysis: The Data Flow Diagram(DFD). Data Dictionary. Decision Tree and Structured English. Decision Tables. Pros and Cons of each Tool.

Feasibility Study (2 Hrs)
Introduction. Systems Performance Definition: Statement of Constraints. Identification of Specific System Objectives. Description of Outputs. Feasibility Considerations. Steps in Feasibility Analysis. Feasibility Report. Oral Presentation.

Cost/BenefitAnalysis (2 Hrs)
Introduction. Data Analysis. Cost/Benefit Analysis: Cost and Benefit Categories. Procedure Cost/Benefit Determination. The System Proposal.

MODULE III

The Process and Stages of Systems Design (4 Hrs)
Introduction. The Process of Design: Logical and Physical Design. Design Methodologies: Structured Design. Form-Driven Methodology-the IPO Charts. Structured Walkthrough. Major Development Activities: Personnel Allocation. Audit Considerations: Processing Controls and Data Validations. Audit Trial and Documentation Control

Input/output and Form Design (3 Hrs)
Introduction. Input Design: Input Data. Input Media and Devices. Output Design. Forms Design: What Is a Form? Classification of Forms. Requirements of Forms Design. Carbon Paper as a Form Copier.
Types of Forms. Layout Considerations. Forms Control.

Data BaseDesign (4 Hrs)
Data Base Design: Objectives of Data Base. Key Terms. Logical and Physical Views of Data. Data Structure. Normalization. The Role of the Data Base Administrator.

MODULE IV

System Testing and Quality Assurance (3 Hrs)
Introduction. Why System Testing? What do we test for? The Nature of Test Data. The Test Plan: Activity Network for System Testing. System Testing. Quality Assurance Goals in the Systems Life Cycle. Levels of Quality Assurance. Trends in Testing. Role of the Data Processing Auditor: The Audit Trail.

Implementation and Software Maintenance (3 Hrs)
Introduction. Conversion: Activity Network for Conversion. Combating Resistance to Change. Post- Implementation Review: Request for Review. A Review Plan. Software Maintenance: Maintenance or Enhancement? Primary Activities of a Maintenance Procedure. Reducing Maintenance Costs.

Hardware/Software Selection and the Computer Contract (3 Hrs)
Introduction. The Computer Industry: Hardware Suppliers. Software Suppliers. Service Suppliers. The Software Industry: Types of Software. A Procedure of for Hardware/Software Selection: Major Phase in Selection. Software Selection. The Evaluation Process. Financial Considerations in Selection: The Rental Option. The Lease Option. The Purchase Option. The Used Computer. The Computer Contract: The Art Of Negotiation. Contract Checklist.

Project Scheduling and Software (1 Hr)
Introduction. Why Do Systems Fail? What Is Project management?

Security, Disaster/Recovery, and Ethics in System Development (2 Hrs)
Introduction. System Security. Definitions. Threats to Systems Security. Control Measures. Disaster/Recovery Planning: The Plan. Ethics in System Development: Ethics Codes and Standards of Behavior.

Suggestion for Practical:*Students are expected to take up at least two Case Studies in SYSTEM ANALYSIS AND DESIGN subject. Implementation is to be with application tools, database tools and test tools. A report needed to be developed and presented during practical exams.*

TEXT BOOKS:

1. System analysis and Design by Bliss M Awad II Edition, Galgotia Publications
2. System Analysis and Design Methods, Jeffery White& Lonmic D Benther, IV Edition, Galgotia Pub

REFERENCE BOOKS:

1. Introducing System Analysis and Design Vol I and Vol II International Edition NCC
2. Analysis and Design of Information System, V. Rajaraman, PHI
3. Introduction to SAD, Iger T Haconyszicwych, PHI
4. Analysis and Design of Information System, J.A. Sema, THM

IT 4.1 DISCRETE MATHEMATICAL STRUCTURES

Lecture Per week : (3+ 1+ 0)
Max Marks for Theory paper : 100
Max marks for sessionals : 20 + 5
Duration of Paper : 3 hours
Total Number of Modules : 4
Number of Questions from Each Module : 2 (Each question shall carry 20marks)
Total Number of Questions to be answered : 5(At least one question from each module with two compulsory questions from any one module)

MODULEI

Relations, Functions, Equivalence relations, Partially ordered sets, Mathematical Induction (5 Hrs)

Recurrence relations, Counting, Permutations, Combinations, Pigeonhole Principle, Principle of Inclusion and Exclusion. (6 Hrs)

MODULEII

Propositional Calculus, Boolean Algebra (5 Hrs)
Algebraic Structures: Monoids, groups, subgroups, cyclic groups, Abelian groups, Homomorphism and isomorphism of groups. (6 Hrs)

MODULE III

Rings, Integral domain, Fields (3 Hrs)

Vectorspaces: Definition, properties, subspaces, Linear combination, Linear span, Linear independence & dependence of vectors, Basis, Finite dimensional vectorspaces. Linear Transformation (8 Hrs)

MODULE IV

Graph Theory: Introduction to graphs, representing graphs and graph isomorphism, connectivity, Euler's and Hamiltonian paths, shortest path problems, planar graphs, graph colouring. (6 Hrs)
Introduction to Languages and finite state machines: Regular expressions, Regular Languages, Finite state automata, Grammars and finite state machines. (6 Hrs)

TEXT BOOKS:

1. A textbook of Discrete Mathematics by Swapan Kumar Sarkar, S. Chand Publications
2. Discrete Mathematics and its applications by Kenneth Rosen, TMH

REFERENCE BOOKS:

1. Elements of Discrete Mathematics by C. L. Liu, TMH
2. Discrete Mathematical Structures by Dr. D.S.C. Prism Books
3. Discrete Mathematics By Seymour Lipschutz, Schaum outline series, TMH

4. Discrete Mathematical structures with applications to Computer Science, Trembley and Manohar, TMH
5. Graph theory with application to Engineering and Computer Science by Narsingh Deo, PHI

IT 4.2 SIGNALS AND SYSTEMS

Lecture Per week	: (3+ 1+ 0)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

Modeling Concepts and Analysis in Time Domain
Introduction, Examples of Systems, Signal Models, Energy and Power Signals, Energy and Power Spectral Densities, System Modelling Concepts, Superposition Integral with Examples, Properties of Covolution Integral, Impulse Response,Step Response, Frequency Response,Stability.

MODULE II

The Fourier Series and The Fourier Transform and Applications
Trignometric and Complex Exponential Fourier Series, Symmetry Properties of the Coefficients, Parsevals Theorem, Line Spectra, Steady State Response Of Distortionless System, Rate of Convergence of Fourier Spectra. The Fourier Integral, Energy Spectral Density, Fourier Transforms In the Limit, Fourier Transform Theorems, System Analysis with the Fourier Transform, Steady State System Response to Sinusoidal Inputs, Ideal Filters Bandwidth and Rise Time.

MODULE III

The Laplace Transform, Introduction and Examples, Theorems, Inversion of Rational Functions, inversion Integral and its use in obtaining inverse Laplace Transform, Double sided Laplace Transform.
Discrete Time signals and systems, Analog to Digital Conversion:Sampling Theorem, Data Reconstruction and Filtering.
The Z transform, properties, Inverse Z transform and methods
Difference Equations and Discrete Time Systems.

MODULE IV

Analysis and Design of Digital Filters, Structures of Digital Processors, Discrete Time Integration, IIR and FIR filter design. The DFT and FFT Algorithms, Comparison of DFT, Computation of DFT, properties Examples, Mathematical Derivation of FFT, Decimation in Time and Frequency, Applications of FFT.

TEXT BOOKS:

1. Signals and Systems by Zeimer, Tranter, Fannin, IE – Prentice Hall of India.

2. Signals and Systems by Oppenheim and Willskay with Hamid Nawab, Prentice Hall of India

REFERENCE BOOKS:

1. Introduction to Signals and Systems by Linder, McGraw Hill.
2. Signals and Systems by Nagrath, Sharan, Rajan and Kumar, McGraw Hill.
3. Signals and Systems by Simon Haykin & Barry Van Veen, John Weily and sons.

IT 4.3 COMPUTER HARDWARE AND TROULESHOOTING

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

PC Components and features.
Microprocessor types and specifications.
Processor family (8086 onwards……..P3, P4, AMD, Dual core)
Motherboard Components.
Introduction to 8259, 8257 and 8275 circuits.
8279 – Keyboard / Display controller: Block diagram, working principle and interface to a PC system.
Organization of a keyboard, types of keyboards and key switches, interfacing of a keyboard.

MODULE II

Secondary storage devices: Hard disk drives: Construction, working principle, installation procedure for single and multiple drives, partitioning and interfacing to a PC system.
Floppy disk drive: Construction, working principle, drive assembly, recording techniques and interfacing to a PC system.
8272 – Floppy disk controller: Block diagram, working principle and interface to drive and PCsystem.
CDROM Drive: Construction, working principle and interface to a PC system.
DVD : working principle and interface to a PC system

MODULE III

I/O interfaces: IDE and SCSI
Buses: Types of buses
Printers: Types of printers, working principle, troubleshooting
Plotters: Types of Plotters.
Power Supply Units: SMPS, UPS, construction, working principle, power line problems and counter measures.

MODULE IV

Troubleshooting and fault finding: Types and nature of faults, fault diagnosis and trouble shooting for each subsystem in a PC, POST.
Diagnostic tools: Logic probe, logic pulser, logic analyzer, IC tester, digital oscilloscope
Diagnostic software: Types, preventive maintenance for a PC system.

TEXT BOOKS:

1. Troubleshooting, Maintenance and Repairing PCs - By Stephen Bigelow, TMH
2. Advanced Microprocessors and Peripherals: Architecture, Programming and Interfacing – By Ray and Bharchandani, TMH
3. IBM PC and Clones – Hardware, Troubleshooting and Maintenance – By Govindarajalu, TMH

REFERENCE BOOKS:

1. Microprocessors and Interfacing – By D.V. Hall, TMH
2. The Complete PC Upgrade and Maintenance Guide – By Mark Minasi, BPB Publications
3. Upgrading and Repairing PCs – By Scout Muller, PHI

IT 4.4 MICROPROCESSOR AND INTERFACING

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max Marks for Practical	: 50
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

Microprocessor 8086:

Detail study of 8086 architecture, addressing modes, instruction formats, data transfer instructions, string instructions, logical instructions, arithmetic instructions, processor control instructions, comparison of 8086 with 8088, assembly language programming, assembly process, assembler directives, procedures-far procedures, near procedures, parameter passing techniques, macros, macro advantages.

MODULE II

8086 CPU Module:

Basic 8086 CPU design, generating system clock and reset signals, microcomputer bus type and buffering techniques. System Bus Structure: Basic 8086 configurations, maximum and minimum mode, system bus timing, interrupts and interrupt responses

8087 Coprocessor: Architecture, connection and cooperation with main processor, Instruction Set of 8087, Programming with the Arithmetic Coprocessor. Use of floating point ADD/SUB/MUL/DIV instructions, Use of F.P. instruction for generating Sine/Cosine/Exp/Log functions.

MODULE III

Interfacing: Programmable Peripheral Interface (PPI): Basic Description of 8255, Architecture, Modes of operation, programming the 8255. Programmable timer 8253/8254

Interrupt Controller: Features of 8259, block diagram of 8259, Interrupt sequence, priority modes and other features Programming the 8259 and interfacing.

Brief introduction to DMA controller and keyboard, Video controller. System Design of 8086

using Memory chips and simple I/O devices using interfaces.

MODULE IV

80386 Architecture : Architecture and signal descriptors, Register organization, Addressing modes, Extended instruction set

Real mode operation of 80836: Real mode operation, Memory addressing and interrupt processing.

Protected mode operation of 80386: Protected mode operation, memory organization – segmentation, descriptor types, and paging, interrupt processing in protected mode. 80386 Memory Management Unit: MMU, virtual memory, descriptor tables GDT, LDT, IDT. Review processors from 80486 onwards.

TEXT BOOKS:

1. The 8086/8088 family design, programming and interfacing – John F.Uffenbeck (PHI)
2. MICROPROCESSORS AND INTERFACING: Programming and Hardware, - By Douglas V. Hall, TMH

REFERENCE BOOKS

1. Microprocessor Systems: The 8086/8088 family architecture programming and design – By Liu and Gibson, PHI
2. Microprocessor Architecture, Programming and Applications - By Gaonkar, PHI

Term work

It shall consist of minimum 8-10 experiments based on the following topics

1. Assembly language programming for 8086. Study of instruction set, Use of MUL/DIV instructions, Use of string processing instruction, use of XLAT instruction for code conversion.
2. Assembly language programming for 8086/8087 Study of NDP instruction set, Use of floating point ADD/SUB/MUL/DIV instructions, Use of F.P. instruction for generating Sine/Cosine/Exp/Log functions.
3. Use of ROM-BIOS services
4. Use of DOS interrupt services.
5. Programs based on 386 addressing modes.
6. Programs based on bit manipulation instructions using assembly language or C.
7. Programs to find square-root of 16-bit number.
8. Interfacing keyboard, display controller, elevators

IT 4.5 DESIGN AND ANALYSIS OF ALGORITHMS

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

Algorithm Analysis & Complexity :
Algorithm Definition and Specification.
Performance analysis (Space complexity, Time complexity, Asymptotic Notations)
Recurrences (methods)
Performance measurement.
Performance analysis of recursive algorithms.
Recursion.
Towers of Hanoi problem.
Comparison of recursion and Iteration.
Dynamic Storage Management.
Garbage Collection.

MODULE II

Divide and Conquer strategy :
General method.
Binary search
Finding Maximum and Minimum.
Merge sort technique.
Quick sort technique
Greedy method strategy :
General method
Knapsack problem
Job sequencing with deadlines
Minimum cost Spanning trees(Prims & Kruskals algorithm)
Optimal storage on tapes.
Optimal merge patterns.
Single source Shortest paths

MODULE III

Dynamic Programming :
General method
Multistage graphs
All pairs shortest paths
Single Source Shortest paths

Knapsack problem
Travelling Sales person problem.
Flow Shop Scheduling.

Search & Traversal Techniques :

Techniques for graphs- Breadth first search, Depth first search, D search.
Connected components and spanning trees.
Biconnected components.
Code Optimization.
Text processing algorithms (pattern matching)

MODULE IV

Backtracking :

General method.
Sum of subsets Problem
Graph Coloring.
Hamiltonian Cycles**.**

NP-Hard & NP-Complete Problems :

Basic concepts- non-deterministic algorithms.
NP-Hard and NP-Complete classes.
COOK's theorem.
NP-Hard Scheduling Problems.
NP-Hard Code generation Problems

TEXT BOOKS:

1. Fundamentals of Computer Algorithms – E.Horowitz & S.Sahini, Galgotia publication.
2. Introduction to Algorithms – T.H.Cormen, C.E. Leiserson, R.L.Rivest, PHI

REFERENCE BOOKS:

1. The Design and Analysis of Computer Algorithms – Aho Hopcraft & Ulman, Addison Wesley.
2. Algorithms – Robert Sedjewick, Addison Wesley.
3. Fundamentals of Algorithms – Brassord & Bratley, PHI

IT 4.6 OBJECT ORIENTED PROGRAMMING

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max Marks for Practical	: 50
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

MODULE I

Introduction**:** Principles of object oriented programming, object-oriented paradigm. Overview and Benefits of Object-Oriented Programming: Approaches to Software Design ,Evolution of the Object Model ,Benefits of Object Programming, Modeling using UML:UML overview, Nature and purpose of models, Static view, Use case view, Static machine view, Activity view, Interaction view

MODULE II

Abstract data types (ADT), Encapsulation and information hiding, tokens, expressions, control structures, functions , Classes and Objects, Constructors and destructors. Concepts of polymorphism, Function overloading, operator overloading, Overloading types, & rules, explicit & implicit type conversion operators.

MODULE III

Inheritance, extending classes, multiple inheritance, hybrid inheritance, pointers, virtual functions, and classes, and polymorphism. I/O streams and classes, Manipulators, Classes for file streams, file I/O operations and functions.

MODULE IV

Template functions and classes, implementation, Exception handling: Need, Throwing mechanism, try, catch block, Introduction to the Standard Template Library: Components of STL, Containers, Algorithms, Iterators, Applications.

TEXT BOOKS:

1. Object oriented programming with C++ by E Balaguruswamy, Tata McGraw Hill
2. Mastering C++ by K R Venugopal, Rajkumar, T. Ravishankar – Tata McGraw Hill
3. The UML Reference Manual by J.Rumbaugh et al,

REFERENCE BOOKS:

1. Teach yourself C++ by Herbert Schildt, TMH
2. Programming with C++ by J. R. Hubbard (Schaum's Outlines), McGraw Hill.

3. Programming with C++ by D. Ravichandran, McGraw Hill.

IT 5.1IDC INTRODUCTION TO DATA COMMUNICATION

Lecture Per week	: (3+ 1+ 0)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

Course Objectives:

To learn and understand fundamentals of data communications.
To understand the conceptual and analytical differences between analog and digital communication.
To understand a conceptual foundation for the study of data communications using the open system interconnection (OSI) layered architecture model..
Review Current events in the field of communications so that the student has a sound working knowledge in today's competitive environment.
Have a clear idea how data could transfer between senders and receivers either wired or wireless.

Instructional Objectives:

After completing this course student shall
- Know the basic concepts of networking.
- Know different network topologies and their advantages and disadvantages.
- Know how to build a network model and why.
- Understand how data could be encoded to digital bits.
- Identify different types of Transmission Mediums.
- Recognize the network layers and their main jobs.
- Apply and differentiate between different error detection and correction methods

MODULE I

Introduction of data communication, Overview, communications model, components, Networks-distributed processing. Protocol architecture : needs, OSI Model(Functions), TCP/IP Model(Functions),Protocols and standards. (3 Hrs)
Basic concepts of data communication, Line configuration, Topology, Transmission modes, Categories of networks, Inter networks. (3 Hrs)
Transmission media: Guided Media – Twisted–pair cable, Coaxial cable and Optical fiber. Unguided Media – Wireless Communication, Terrestrial microwave, satellite communication and cellular telephony. (3 Hrs)
Shannon's Theorem, Comparison of different Media, Transmission Impairments - Distortion, Attenuation and noise. Performance. (3 Hrs)

MODULE II

Data Encoding: Digital data digital signals : Unipolar, polar, Bipolar. Analog data Analog signals : AM, FM, PM. Digital data analog signals: ASK, FSK, PSK. Analog data digital signals: PAM, PCM (4Hrs)
Data communication interface: Physical Layer. Digital Data transmission: Asynchronous and synchronous transmission. DTE-DCE interface, Modems-56k,cable modem. Interfacing: V.24/EIA 232-F, ISDN Physical Interface (5 Hrs)
Spread Spectrum: Concept, FHSS, DSSS, CDMA (2 Hrs)

MODULE III

Data Link Layer: Flow Control – Stop and Wait Flow Control, Sliding Window Error Detection: Types of errors, Detection Methods, Parity Check, VRC, LRC,CRC using modulo-2, Polynomials (CRC-16, CRC-32),Checksum. Error Correction: Hamming Code. Error Control – Stop and Wait ARQ, Go-Back-NARQ and Selective-Reject ARQ . (6 Hrs)
Data Link Protocols Asynchronous Protocols, Synchronous Protocols. Character Oriented Protocols – BSC. Bit-Oriented Protocols- HDLC, Configuration, Types of frames and Modes of Communication, operation. Switching: Packet Switching, Circuit Switching and Message Switching. (5 Hrs)

MODULE IV

Local Area Networks: Introduction, Topologies (Bus, Ring, Star, Tree) and transmission media. LAN Protocol Architecture : LLC(Logical Link Control), Medium Access Control (MAC) (3 Hrs)
Introduction to Networking and Internetworking devices. Repeaters, Routers, Gateways, Bridges: Functions, Protocol Architecture and Spanning Tree Approach. Wireless LANs: Technology, Requirements, Wireless LAN applications. (5 Hrs)
High Speed LANs: Emergence, Ethernet, Token Ring, Fiber channel. (2 Hrs)
Case Study: Introduction to Blue tooth (In brief) (1 Hr)

TEXT BOOKS:

1. Data and Computer Communication - William Stallings. Seventh edition.
2. Data Communication and Networking – B.A. Forouzan, Tata McGraw Hill

REFERENCE BOOKS:

1. Computer Networks – Andrew Tanenbaum
2. Computer Networks and Internets -Douglas Comer
3. Design and Analysis of Computer Communication Networks – V. Ahuja, McGraw Hill

IT 5.2DSP DIGITAL SIGNAL PROCESSING

Lecture Per week	: (3+ 1+ 0)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

Course Objectives:

- To learn methodology to analyze signals and systems
- To get acquainted with the DSP Processors

Instructional Objectives

At the conclusion of this course, students will be able to:

- Describe the Sampling Theorem and how this relates to Aliasing and Folding.
- Determine if a system is a Linear Time-Invariant (LTI) System.
- Take the Z-transform of a LTI system
- Determine the frequency response of FIR and IIR filters.
- Understand the relationship between poles, zeros, and stability.
- Determine the spectrum of a signal using the DFT, FFT, and spectrogram.
- Design, analyze, and implement digital filters in Matlab

MODULE I

Introduction (3 Hrs)

Digital signal processing and its benefits, Application areas, Key DSP operations, Overview of real-world applications of DSP, Audio applications of DSP, Telecommunication applications of DSP

Analog I/O interface for real-time DSP systems (7 Hrs)

Typical real-time DSP systems, Analog-to-digital conversion process, Sampling – lowpass and bandpass signals, Uniform and non-uniform quantization and encoding, Digital-to-analog conversion process: signal recovery, The DAC. Constraints of real-time signal processing with analog input/output signals. Application examples.

MODULE II

Discrete transforms (4 Hrs)

Introduction. DFT and its inverse. Properties of the DFT. Computational complexity of the DFT. The decimation-in-time fast Fourier transform algorithm. Inverse fast Fourier transforms. Implementation of the FFT. Worked examples.

The z-transform and its applications in signal processing (6 Hrs)

Discrete-time signals and systems. The z-transform. The inverse z-transform. Properties of the z-transform. Some applications of the z-transform in signal processing-Pole-zerodescription of discrete-time systems. Frequency response estimation. Frequency units used in discrete-time systems. Stability consideration. Impulse response estimation.

Applications in digital filter design. Realization structures for digital filters.

MODULE III

Correlation and convolution (6 Hrs)

Introduction. Correlation description- cross and autocorrelation. Fast correlation. Convolution description- properties of convolution. circular convolution. System identification. Deconvolution. fast linear convolution, overlap-add method, overlap-save method. The relationship between convolution and correlation. Implementation of correlation and convolution.

A framework for digital filter design (4 Hrs)

Introduction to digital filters. Types of digital filters: FIR and IIR filters. Choosing between. FIR and IIR filters. Filter design steps. Illustrative examples.

MODULE IV

Finite impulse response (FIR) filter design (5 Hrs)

Introduction. FIR filter design. FIR filter specifications. FIR coefficient calculation methods. Window method. Frequency sampling method. Realization structures for FIR filters

Design of infinite impulse response (IIR) digital filters (5 Hrs)

Introduction. Design stages for digital IIR filters. Performance specification. Coefficient calculation methods for IIR filters. Impulse invariant method of coefficient calculation. Bilinear z-transform (BZT) method of coefficient calculation. Use of BZT and classical analog filters to design IIR filters. Realization structures for IIR digital filter

TEXT BOOKS:

1. Digital Signal Processing – A practical approach by Emmanuel C. Ifeachor, Barrie W. Jervis, Pearson Education Limited
2. Introduction to Digital Signal Processing by Johnny Johnson, Prentice –Hall of India Private Limited
3. Digital Signal Processing – Principles, Algorithms and Applications by John G. Proakis, Dimitris G. Manolakis, Prentice –Hall of India Private Limited

REFERENCE BOOKS:

Digital Signal Processing by S. Salivahannan, A Vallavaraj, C Gnanapriya, Tata McGraw Hill Publishing Company Limited

IT 5.3SE SOFTWARE ENGINEERING

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

Course Objectives:
To learn and understand the concepts of Software Engineering. To apply the Principles of Software Engineering for Software Development. Students will gain experience in software project management; requirements, analysis, and design; procedural maturity;social, ethical, cultural, and safety issues in deployment; interpersonal skills for management and team membership; and the software engineering tact of systems architecture.

Instructional Objectives:
Students who complete this course will feel comfortable in the role of a Software Designer, Software Architect or Project Manager for the development of software to solve business and technical problems. Students become conversant in methodologies, architectural approaches, project management techniques, and team dynamics.

MODULE I

Classical Software Engineering: (9 Hrs)
Introduction to Software Engineering, scope of software engineering: The software process- client, developer and software development life cycle user requirement phase, specification phase, Design phase implementation phase, Integration phase, maintenance phase improving the software process, capability maturity models, costs and benefits of software process management.
Software life cycle models and comparison of all life cycle models. (3Hrs)

MODULE II

Basic design concepts: (3 Hrs)
Cohesion and its various types, coupling and its various types and partitioning.
Effort estimation and scheduling, Cost estimation models- Function point analysis and COCOMO Interoperability- CASE tools in use for object oriented software engineering- UML and its usage in software engineering (6 Hrs)
Software Re-engineering (2 Hrs)

MODULE III

Software testing: (6 Hrs)
software quality assurance, The essentials of software testing, clean sheet approach, verification testing, validation testing , Software testing tools- for classical engineering and

object oriented engineering- software testing standards

Integration testing: (5 Hrs)

Master test planning, Organizational approaches to testing object oriented testing, Testing standards

MODULE IV

Software Project management: (8 Hrs)

Managing software project, project planning, process planning- the standard process, requirement change management, quality management, Risk management, the project management plan team structure, communication, scheduling, quality planning, measurement and tracking planning, team programming aspects, software configuration management.

Project execution, project monitoring and control, project closure performing, closure analysis, closure analysis report. (3 Hrs)

TEXT BOOKS:

1. Object Oriented and Classical Software Engineering- Stephen R.Schah (TMH)
2. Software Project Management in practice- Pankaj Jalote- PEA
3. Software Engineering – A practitioner's approach – by Roger S. Pressman, McGraw Hill (6^{th} edition)

REFERENCE BOOKS:

1. A discipline for Software Engineering – by Watts S. Humprey, Pearson Education
2. Software Engineering – by K. K. Aggarwal and Yogesh Singh, New Age Publications
3. 'Ed-Kit'- Software testing in real world. Addison Wesley 1995
4. Effective methods for software testing(second edition) John-Wiley 1999
5. Software testing techniques(2^{nd} edition) Van Nostrand Rein loud 1990
6. The art of software testing, Jon Wiley Mayers G.J.

IT 5.4IA INTELLIGENT AGENTS

Lecture Per week	: (3+ 1+ 0)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

Course Objectives

- To understand the concepts of Artificial intelligence
- Learn and Understand the knowledge representation techniques for knowledge base
- To Learn and Understand the fundamentals of Neural Network

Instructional Objective:

At the end of the course the student will be able to analyze a problem which requires intelligent techniques to solve. Student will also learn the knowledge representation and manipulation techniques.

MODULE I

Intelligent agents: environment, properties and structure. Problem solving agents. Searching for solutions. Breadth-first search, Depth-first search, uniform-cost search, Depth-limited and Iterative deepening depth-first search. Heuristic search strategies: Best-first search, memory bounded heuristic search, Hill climbing search and simulated annealing search (8 Hrs)

Constraint Satisfaction problems, backtracking search, propagating information. (2Hrs)

Game Playing, the minimax algorithm, alpha-beta pruning, imperfect-real time decisions, games involving an element of chance. (3 Hrs)

MODULE II

Logical agents, Propositional logic, reasoning in propositional logic. First order predicate logic, Inference in First-order predicate logic. Unification algorithm. Forward chaining, backward chaining. conjunctive normal form for predicate logic. theorem proving by resolution principle. (8 Hrs)

Semantic networks. Reasoning with default information. Truth maintenance system. (4 Hrs)

MODULE III

Planning problem, Planning with state space search, Partial order planning. (4Hrs)

Acting under uncertainty, conditional probability, the axioms of probability, full-joint distribution, independence, Bayes' rule. and its use.. Bayesian (belief) networks. (6Hrs)

The basis of utility theory and utility functions. (2Hrs)

MODULE IV

Forms of learning, inductive learning, learning decision trees. (4Hrs)

Learning in Neural networks. (3 Hrs)

Communication as action, syntactic analysis, augmented grammars, semantic interpretation (5 Hrs)

TEXT BOOKS:

1. Stewart Russel and Peter Norvig. " Artificial Intelligence- A Modern Approach", PHI, 1995
2. Elain Rich and Kevin Knight, "Artificial Intelligence", TMH, second edition. 1993

REFERENCE BOOKS:

1. Nils J Nilsson, :Artificial Intelligence- A new Synthesis", Harcourt Asia PTE Ltd, Morgan Kaufman 1988
2. Eugene Charniak and Drew Mc Dermott, Addison Wesely, "Introduction to Artificial Intelligence", ISE Reprint 1998.

IT 5.5OS OPERATING SYSTEMS

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max Marks for practical	: 50
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

Course Objective:

The Operating System is a program that acts as an intermediary between a computer user and the computer hardware. The primary aims of an operating system are resource management, scheduling and access control. This course aims to describe the fundamental concepts behind operating systems, and examine the ways in which its design goals can be achieved.

Instructional Objective:

At the end of the course, the students should know:

1. The fundamental concepts of operating systems, its evolution and various architectures.
2. The terminologies associated with operating system concepts such as processes, threads, concurrency control, synchronization, CPU scheduling and semaphores.
3. The general concepts and algorithms used in process management, deadlock handling, memory management, file systems, I/O systems and security.
4. Implementation specific issues based on the Linux and Windows Operating Systems.

MODULE I

Introduction to Operating Systems: Overview and working of different operating systems. (3Hrs)

Process management: Concept, Threads, CPU Scheduling, Process Synchronization.(4Hrs)

Deadlocks: Concept, Deadlock prevention, Deadlock avoidance, Deadlock detection and recovery. (5Hrs)

MODULE II

Memory management: Concept, Swapping, Contiguous memory allocation, Paging, Segmentation, Segmentation with paging. (5Hrs)

Virtual memory: Concept, Demand paging, Page replacement, Thrashing. (4Hrs)

File System: File system interface and File system implementation (3 Hrs)

MODULE III

I/O Systems: Overview of I/O Systems, Secondary storage structure, Tertiary storage structure. (08Hrs)
Protection and security issues. (03Hrs)

MODULE IV

Case studies of operating systems- Windows and Unix. (08Hrs)
Basic overview, commands, process management and memory management in each.
Shell programming in Unix. (03Hrs)

TEXT BOOKS:

1. The Operating System Concepts by Silberschatz and Galvin, Wesley Publishing Co. (page numbers given in syllabus as per the 3rd edition)
2. Operating Systems by W Stallings. PHI. (page numbers given in syllabus as per the 5th edition)
3. UNIX – Concepts and applications by Sumitabha Das, Tata McGraw Hill (page numbersgiven in syllabus as per the 3rd edition)

REFERENCE BOOKS

1. Operating systems, Design and implementation by A.S Tanenbaum,PHI.
2. Operating Systems by Milenkovic, Tata McGraw Hill.
3. Operating Systems by Achyut S. Godbole, Tata McGraw Hill.
4. The Design of the UNIX Operating System by Maurice J. Bach, PHI
5. Linux Kernel Internals by M Beck, H Bohme, M Dziadzka, U Kunitz, R Magnus, DVerworner, Addison Wesley
6. Unix System Programming using C++ by Terence Chan, PHI

IT 5.6 DATABASE MANAGEMENT SYSTEMS

Lectures per week	: (3+1+2)
Max. Marks for Theory paper	: 100
Max. Marks for Sessionals	: 20 + 5
Max. Marks for Practical Exam	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module).

Course Objective:

This course introduces database management system (DBMS) which is computer software designed for the purpose of managing databases. It is a collection of programs that enables you to store, modify, and extract information from a database. The students will learn Database concepts, Data Models, various approaches to Database Design, Relational Model, Optimization principles and Control.

Instructional Objective:

At the end of the course the student will be able to:

1. Understand the key concepts and terminology of RDBMS
2. Learn the basics of database modeling.
3. Understand database design and normalization techniques.
4. Implement access to the data using various techniques.
5. Know the strategies and methods for query processing, optimization, database transaction processing and security.

MODULEI

Database systems versus File system. Data base administrator & Data base Users. Characteristics of the Data base. Data base Systems Architecture. Data Models View of data. Schemes & Instances . Database system Architecture & Data Independence Data base Languages. (3 Hrs)

Entities, Attributes and Relationships. Cardinality of Relationships, Keys, Strong and Weak Entity Sets. E-R Diagram notation. Extended ER: Generalization, Specialization, and Aggregation. Translating your ER Model into Relational Model (3Hrs)

Relational Data Model & Relational Algebra. Relational Model Concepts. Relational Model Constraints and Relational Algebra. Operations like select, project, rename, Set operations, join, Division, Aggregate functions (3Hrs)

Tuple variables, Range Relations, Expressions, Formulae, Quantifiers, Safe Expressions. Domain Relational Calculus : Formal Definition, Safe expressions (3Hrs)

MODULE II

Structured Query Languages (SQL): Data Definition in SQL-Insert, Delete, Update, Create, Data Manipulation Query:Select with all options, Aggregate functions , Nested sub

queries, View and Queries in SQL, Specifying Constraints and Indexes in SQLQBE (Query-By-Example) (4Hrs)

Schema refinement: Problems Caused by redundancy, Functional dependencies-Closure of set of FD's, Closure of attribute set, Canonical cover keys, Decompositions Problem related to decomposition, reasoning about FDS, Normalization, FIRST, SECOND, THIRD Normal forms, BCNF, Lossless join Decomposition, Dependency preserving Decomposition, Schema refinement in Data base Design, Multi valued Dependencies, fourth Normal Form, Domain key Normal form DKNF, Project join Normal form PJNF. (8Hrs)

MODULE 3

Query Processing: Measures of query cost selection, Translating SQL queries into Relational algebra: Sorting, Join, Nested Loop join, Block Nested Loop join, Merge join, Hybrid-Hash join and Pipelining. Using Heuristics in Query Optimization: Query tree, Query graph, Converting query trees into Query evaluation plan using selectivity and cost estimates in optimization. (9 Hrs)

Query Optimization using database language (2 Hrs)

MODULE 4

Database Security and Authorization: Types of security, database security and DBA, Granting/Revoking of privileges (using views) examples, Multilevel security (3 Hrs)

Transaction Processing Concepts: Introduction to Transaction processing, Transaction and system Concepts, Desirable properties of Transactions, Commit and rollback of transactions. (3 Hrs)

Database Recovery techniques: Concepts, Recovery techniques based on deferred update: Single user, Multi User. Immediate update-Undo/redo, ARIES recovery algorithm Recovery in multidatabase systems. (3 Hrs)

Concurrency Control techniques: Locking Techniques for concurrency Control, Concurrency Control based on timestamps ordering, Multiversion Concurrency Control Techniques (3Hrs)

TEXT BOOKS:

1. Database System Concepts by Abraham Silberschatz, Henry F. Korth- 4th Ed., TMH
2. Fundamentals of Database Systems by Elmasri & Navathe, Addison Wesley 3rd Ed.,

REFERENCE BOOKS:

1. An Introduction to Data Base Systems by C. J. Date Pearson Education, Addison Wesley
2. An Introduction to Database Concepts by Desai B, Galgotia
3. Principles of Data base systems by J. D. Ullman, "2nd Ed., Galgotia Publications, 1999

IT 6.1ED ENTREPRENEURSHIP DEVELOPMENT

Lecture Per week	: (3+ 0+ 0)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

Course Objective:

To expose the students to the comprehensive Entrepreneurship Development and equip them with requisite skills, knowledge and competencies so that they can take up Entrepreneurship as their career

Instructional Objective:

At the end of the course, the students would be familiar with the following:
•Concept of Entrepreneurship.
•Project identification, development and implementation
•Project financing, institutional finance and SSI
•Project Management.

MODULE I

Definition and clarification of concept of entrepreneurship: Qualities of an entrepreneur Skills required for entrepreneurship, Functions of an entrepreneur, Importance of entrepreneur in economic development. (2 Hrs)

Theories of Entrepreneurship: Economic theory, Sociological theory, Psychological theory. (1 Hr)

Types of entrepreneurs: Based on type of business, Based on use of technology, Based on motivation, Based on stages of development, Based on motive, Based on capital ownership, Danhof's classification. Other types (1 Hr)

Project identification: External environment analysis, Meaning and characteristics of a project, Classification of projects, Project life-cycle, Project identification, Sources and screening of project ideas. (2 Hrs)

Project formulation: Meaning and significance, Feasibility analysis, Techno-economic analysis, Input analysis, Financial analysis, Social cost benefit analysis. Project feasibility (1 Hr)

Pre-feasibility study: Project feasibility report - Meaning, Importance and Contents Importance of location of a project. (2 Hrs)

MODULE II

Project financing and institutional finance: Classification of capital – Fixed capital - Meaning, Factors governing fixed capital requirements, Working capital – Meaning and concepts, Types, Factors determining working capital requirements. (2 Hrs)

Sources of finance – Share capital, Debenture capital, Lease finance and term loans from

commercial banks. (1 Hr)
Institutional finance. IFCI, ICICI, IDBI, SIDBI, EXIM Bank, Commercial banks – Functions and schemes (2 Hrs)
Small scale industries: Definition and characteristics, Role in Indian economy, Steps for starting a SSI unit, Problems faced by SSIs. Incentives and subsidies – Need and Types. (3 Hrs)

MODULE III

Financial aspects: Break even analysis, Income statement, Balance sheet. (5 Hrs)
Profit and loss account, Fund flow statement, Ratio analysis – Liquidity, leverage and profitability ratios. (4 hrs)
Capital budgeting – Need, Importance, Process, Nature of capital budgeting problem, Weighted average cost of capital, approaches to fixing a capital budget, methods of project evaluation (Payback period, Accounting rate of return, discounted cash flow, Net Present Value Index) (4 Hrs)

MODULE IV

Managerial aspects: Introduction to management, Functions of a manager, Different schools of management. (5 Hrs)
Types of organisation structures, Leadership- Trait theory, Behavioural theory, Contingency theory, Motivation -Carrot and stick theory, Maslow's theory, Herzberg's theory, Vroom's theory, McClelland's theory. (3 Hrs)
Communication – Importance, Process, types and forms, Barriers to communication, Principles of effective communication. (2Hrs)
Marketing management, Meaning and importance, Marketing mix, Types of marketing tasks, Market segmentation – process and criteria, Marketing implementation and control. (3 Hrs)

TEXT BOOKS:

1. Entrepreneurial Development and Project Management by A. Vinod 4th Edition Calicut University Publication, 2002
2. Entrepreneurship and Small Business Management by Dr C.B. Gupta and Dr. S.S. Khanka 2nd Edition, Sultan Chand and Sons, 1997
3. Entrepreneurship Development by Dr. C.B.Gupta and N.P.Srinivasan 4th Edition, Sultan Chand and Sons, 1997

REFERENCE BOOKS

1. Marketing Management by Philip Kotler 11th edition, Pearson Education, 2003
2. Principles of Management by P. C. Tripathi and P.N. Reddy 2nd Edition Tata McGraw Hill, 1991
3. Fundamentals of Financial Management by Prassanna Chandra 3rd Edition Tata McGraw Hill, 2001
4. Management by Harold Koontz and Heinz Weihrich 9th Edition McGraw Hill, 1988

IT 6.2TC THEORY OF COMPUTATION

Lecture Per week : (3+ 0+ 2)
Max Marks for Theory paper : 100
Max marks for sessionals : 20 + 5
Duration of Paper : 3 hours
Total Number of Modules : 4
Number of Questions from Each Module : 2 (Each question shall carry 20marks)
Total Number of Questions to be answered: 5(At least one question from each module with two compulsory questions from any one module)

Course Objectives

The major objective of this course is to introduce the student to the concepts of theory of computation in computer science. The student should acquire insights into the relationship amongst formal languages, formal grammars, and automata.

Instructional Objective:

At the end of the course, the students would be familiar with the following:

- formal languages and grammars
- finite-state automata, pushdown automata
- Turing machines, Church's Thesis, undecidability
- Recursively Enumerable Languages and Unsolvable Problems.

MODULE I

Regular Languages and Finite Automata :- Regular Languages and Regular Expressions, The memory required to recognize a language, Finite Automata (DFA), Distinguishing one string from another, Union, Intersection, and Complements. (6 Hrs)

Nondeterministic and Kleene's theorem :- NFA, Converting NFA to DFA,€-NFA ,Kleene's theorem, Converting an €-NFA to an NFA, Regular Languages, MyHill-Nerode theorem Minimal finite Automata, The pumping lemma for regular languages, Closure properties Decision Problem, Moore and Mealy Machine. (6 Hrs)

MODULE II

Context –free Grammars and Push down Automata:- Context –Free Grammars and Languages Derivation Trees and Ambiguity, An unambiguous CFG for algebraic Expression, Simplified forms and Normal Forms – CNF, GNF. (6 Hrs)

Pumping Lemma,Closure Properties, Push Down Automata :- DPDA, PDA corresponding to a given CFG – Top-down PDA, Bottom-up PDA, CFG corresponding to a given PDA, Parsing Top-down parsing, Bottom-up parsing. (6 Hrs)

MODULE III

Turing Machine and their languages :- Turing Machine Introduction, Computing a Partial function with a Turing machine, Combining Turing machine. (8 Hrs)

Variations of Turing Machine, Nondeterministic Turing Machine, Universal Turing Machine,

Church-Turing Thesis. (4 Hrs)

MODULE IV

Recursively Enumerable and Recursive languages, Enumerating a Language, General Grammars Unrestricted Grammars and Turing Machine. Context-Sensitive Language and Grammar Linear Bounded Automata, Chomsky Hierarchy. (8 Hrs)

Unsolvable Problems :- A non recursive language and unsolvable Decision problems, Reducing one problem to another, The halting problem. Rice's Theorem. Closure Properties of families of languages. (8 Hrs)

TEXT BOOKS:

1. Introduction to languages and the theory of computation By John C. Martin, Tata McGraw Hill
2. Introduction to Automata Theory, Languages and Computation By Hopcraft and Ullman, Narosa Publishing House

REFERENCE BOOKS:

1. Theoretical Science - By Krishnamurthy, AWEP.
2. Theory of Computer Science - By Brady, McGraw Hill.
3. Computations, Finite and Infinite Machines - By Minsky, Prentice Hall

IT 6.3CN COMPUTER NETWORKS

Lecture Per week : (3+ 1+ 2)
Max Marks for Theory paper : 100
Max marks for sessionals : 20 + 5
Duration of Paper : 3 hours
Total Number of Modules : 4
Number of Questions from Each Module : 2 (Each question shall carry 20marks)
Total Number of Questions to be answered: 5(At least one question from each module with two compulsory questions from any one module)

Course Objective:
This course will focus on imparting knowledge about various components of data communications emphasizing on the physical layer and data link layer of the OSI stack. It also provides overview of computer networks .

Instructional Objectives:
At the end of the course, the student will:
•Understand the basic concepts of data communication components used at various transmission speeds.
•Identify the characteristics and analyze specific role of Data Communication technologies such as multiplexers, ISDN, ATM, wireless, satellite and fiber optic communication.
• Get an overview of 3G networks, LAN and WAN

MODULE I

Data Link Layer - Medium Access Sub layer (MAC). Multiple Access Protocols: ALOHA, Carrier Sense Multiple Access (CSMA) protocols, Collision-free protocols – Bit-Map Protocol, Binary Countdown, Limited contention protocols – Adaptive Tree Walk Protocol , WDMA (Wavelength Division Multiple Access) Protocol.
Network Layer: The OSI Model and functions of the seven layers, TCP/IP Protocol stack – Concept of IP Address ARP, RARP, ICMP, Ports and Sockets, TCP and UDP Connections.

MODULE II

Network Layer (Contd.): Network Layer design issues , Routing Algorithms, CongestionControl algorithms. Networking and Internetworking Devices: Repeaters, bridges, routers and gateways. Application Layer of TCP/IP: Domain Name System – DNS, File Transfer Protocol – FTP Telnet Protocol, Hyper Text Transfer Protocol (HTTP) , Simple Mail Transfer Protocol (SMTP) Simple Network Management Protocol (SNMP)

MODULE III

Integrated Services Digital Network (ISDN): Principles & Objectives of ISDN, User Interface of ISDN, Architecture of ISDN, ISDN Physical Layer, ISDN Data Link Layer.

MODULE IV

Frame Relay: Frame Relay - Protocols and Services, Frame Relay Congestion Control . Asynchronous Transfer Mode – ATM: Asynchronous ATM – ATM Protocols, ATM Adaptation Layer, ATM Traffic and Congestion Control . Wireless Communication – An Overview: History of wireless communication, and future trends Wireless Generations and Standards, Cellular Concept and Cellular System Fundamentals , Wireless Standards. Antennas : WLAN Technology and Bluetooth, Introduction to Wireless WANs , GSM Networks, Satellite Communications.

TEXT BOOKS:

1. Data and Computer Communication - William Stallings
2. ISDN and Broadband ISDN with Frame Relay & ATM – William Stallings, 4th Edition

REFERENCE BOOKS:

1. Computer Networks – Andrew Tanenbaum
2. Wireless Networked Communications: Concepts, Technology and Implementation- Bud Bates
3. Computer Networks and Internets - Douglas Comer
4. Design and Analysis of Computer Communication Networks – V. Ahuja ,McGraw Hill

IT 6.4CG COMPUTER GRAPHICS

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max Marks for Practical	: 50
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2 (Each question shall carry 20marks)
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

*Disclaimer: Page numbers listed for each topic are only suggestions. Teacher may include

Course Objectives:

•This course is designed to provide a comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.

•A thorough introduction to computer graphics techniques, including 3D modeling, rendering and animation. Topics cover: geometric transformations, geometric algorithms, 3D object models (surface and volume), visible surface detection algorithms, image synthesis, shading and mapping, global illumination and animation techniques

Instructional Objectives

•Describe the purpose of Computer Graphics and its applications

•Describe and implement methods for performing 2-Dimensional geometric transformations.

•Describe the concept of 3-Dimensional Graphics and methods for performing 3-Dimensional geometric transformations.

MODULE I

Overview of graphic systems**:** Video display devices, Refresh cathode ray tubes Raster scan displays, Random scan displays, Color CRT monitors, Direct view storage tubes Flat panel Displays, Raster scans systems, Random scan systems. Input devices: Keyboard, Mouse, Trackball and Space ball, Joystick, Image scanners, Touch panels, Light pens (5 hrs)

Output Primitives. Points and lines, Line drawing algorithms, DDA, Bresenhams line algorithm Circle generating algorithms, Properties of circles, Midpoint circle algorithm, Ellipse generating algorithm, Properties of Ellipses, Midpoint ellipse algorithm, Filled area primitives, Scan line polygon Fill algorithm, Inside – outside tests, Scan line fill of curved boundary, Boundary fill algorithm, Flood fill algorithm, Fill area functions. (5 hrs)

Attributes of Output Primitives: Line Attributes, Pen and brush options, Curve attributes, Color and gray scale levels, Color tables, Area fill attributes, Character attributes, Text attributes, Marker attributes, Antialiasing . (3 Hrs)

MODULE II

Two Dimensional Geometric Transformations: Basic Transformations, Translation, Rotation, Scaling, Composite transformation, Translations, Rotations, Scaling, Other transformations,

Reflection, Shear. (2 Hrs)
Two-Dimensional Viewing:The viewing pipeline, Viewing coordinate reference frame, Window to viewport coordinate transformation, 2-D viewing functions, Clipping operations, Point Clipping, Line clipping , Cohen- Sutherland Line Clipping, Polygon Clipping, Sutherland Hodgeman Polygon clipping, Weiler- Atherton Polygon Clipping, Other polygon clipping algorithm. Curve clipping, Text clipping. (4 Hrs)
Graphical User Interface and Interactive Input Methods: Input to Graphical Data, Logical classification of Input devices, Locator devices, Stroke devices, String devices, Valuator devices Choice devices, Pick devices. (2 Hrs)
Graphical Input Techniques: Positioning Techniques, Pointing and Selection, Inking and Painting Event Handling: Polling, Interrupts, The Event Queue, Light-Pen Interrupts. Input functions. Raster Graphics Fundamentals. Window and View port. (4 hrs)

MODULE III

Three Dimensional Concepts: 3- Dimensional display methods, Parallel projections Perspective projection, Depth cueing, Surface rendering, Exploded and cutaway views. Three Dimensional Object representations, Polygon surfaces, Polygon tables, Three Dimensional Geometric and Modeling transformations. (4 Hrs)
Three Dimensional Viewing, Transformation from world to viewing coordinates Projections. Design of a Simple Graphics Package. Functional Domains, Graphic Primitives Windowing Functions, Miscellaneous Functions. (4 Hrs)
Picture Structure: Defining Symbols By Procedures, Display Procedures, Boxing, Structured Display Files. Techniques for Achieving Realism. Curves And Surfaces: Shape Description Requirements, Parametric Functions, Bezier Methods. B-Spline Methods. (4 Hrs)

MODULE IV

Classification of visible – surface detection algorithms. Illumination Models and Surface-Rendering Methods. Color Models and Color Applications. Computer Animation**:** Design of animation sequences, General computer animation functions, Raster Animations, Computer animation languages, Motion specification, Direct motion specification, Goal directed systems Kinematics and dynamics. (7 Hrs)
Display Processors. Device-Independent Graphics Systems,Device Independence, Graphics System Design. User Interface Design, Components of the User Interface. The Users Model. (5Hrs)

TEXT BOOKS

1. Computer Graphics By Donald Hearn and M. P. Baker, Prentice Hall of India Pvt. Ltd. ISBN-81-203-0944-8.
2. Principles of Interactive Graphics By William Newman and Robert Sproull, Tata McGraw hill Publishing company Ltd. ISBN-0-07-463293-0

REFERENCE BOOKS:

1. Introduction to Computer Graphics By N. Krishnamurthy, TMH
2. Computer Graphics By Steven Harrington, Tata McGraw Hill.

3. Computer Graphics: Principles and Practice By Foley, Van Dam, Feiner and Hughes

IT 6.5WT WEB TECHNOLOGY

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max Marks for Practical	: 50
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

Course objectives:

This course introduces the technologies behind today's web-based applications. Students will be motivated to working with and building real web applications. After completing this course, students will acquire a good understanding of the basic design principles of the web model of computing.

Instructional objectives:

At the end of course student will be able to apply the technology to build and maintain web pages in static or dynamic manner.

MODULE I

Domain name servers, HTTP, Web browsers, Web Servers, Proxy Servers, Web searching and Web casting techniques. (4Hrs)

Creating a website and mark-up languages: HTML, XML, JavaScript, CSS, Ajax (7Hrs)

MODULE II

Java Technology: Java Evolution, Overview of Java and JVM, Data types and scope of variables Classes, objects and methods, Arrays, strings and vectors, Interfaces, Packages, Exceptional Handling, Thread Programming, File Handling in Java. (8 Hrs)

GUI/Swing Programming, JDBC. Applet Programming (4Hrs)

MODULE III

Understanding the .Net Framework: .Net Frame work, benefits, Elements of the framework, Common Language Runtime:.Net Class Library, Unifying Components,.Net with ASP.Net, (6Hrs)

Creating and deploying an ASP.net application. Building Forms with Web Controls. Validating User Input .ASP.net Security:IIS Server, Authentication , Role-based Security. (6Hrs)

MODULE IV

User Sessions in e-commerce applications. Techniques for maintaining state information. Types of Web Pages: Static, Dynamic, Active (2 Hrs)

Java Servlets, JSP –life cycle, implementation (6 Hrs)

E-Commerce security issues: Cryptography, Digital Signatures, Digital Certificates

Case Study on Ruby on Rails- Ruby, Rails, Advantages of Ruby on Rails. (3Hrs)

TEXT BOOKS:

1. Web Technologies by Achyut Godbole, Wesley Publishing Co.2008
2. Programming with Java by E. Balaguruswamy. TMG. (3rd Edition)
3. ASP.net Bible by Mridula Parihar et. all. Tata MCgraw Hill (2005)
4. Internet and World wide Web. How to program byP.J Deitel .H.M Deitel (4th Edition)

REFERENCE BOOKS:

1. Java 2 Complete Reference – Herbert Schildt -3rd edition.
2. Internet and web technologies by Raj kamal (2002

http:// www.ajax.org

http:// www.rubyonrails.org

IT 6.6STQA SOFTWARE TESTING AND QUALITY ASSURANCE

Lecture Per week	: (3+ 1+ 2)
Max Marks for Theory paper	: 100
Max marks for sessionals	: 20 + 5
Duration of Paper	: 3 hours
Total Number of Modules	: 4
Number of Questions from Each Module	: 2
Total Number of Questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

Course Objectives:

To enable students to develop and implement an effective testing strategy, plan and prepare appropriate tests for all phases of development and be able to measure and control the quality of their testing. To convince students of the importance of finding and resolving error early and to give them strategies and techniques for building-in quality from the start.

Instructional objectives:

This course will enable students to:

- Manage, plan and prepare rigorous, formal, visible and repeatable tests that will fully exercise software, in the development of quality systems.
- Apply different testing approaches to all stages of software development.
- Prepare test plans, strategy, specifications, procedures and controls to provide a structured approach to testing.
- Apply the techniques and methods covered to testing packages.
- Describe the different types of testing tools available and identify the appropriate types of tools for their needs.

MODULE I

Introduction: Quality perspective and expectations, Quality framework and ISO 9126, Correctness and defects. Quality Assurance: Classification, Defect prevention, Defect reduction, Defect containment. Quality Assurance in context: Handling discovered defects during QA activities, QA activities, Verification and validation perspective (7 Hrs)

Quality Engineering: Activities & Process, Quality planning, Quality assessment & improving, ISO 9000 series standards. Capability Maturity Model integration for software engineering. (5 Hrs)

MODULE II

Testing concepts, issues and testing: Purpose, activities, process and context, issues and questions about testing, Functional v/s structural testing, Coverage based v/s usage based testing. Test activities management and automation: Test planning and preparation, Test execution, result checking and measurement, Analysis and follow up, Activities, people and management. Coverage and usage testing based on checklists and partitions: Checklist based testing and limitations, Testing for partition coverage, Usage based statistical testing with Musa's operational profiles. (8 Hrs)

Input domain partitioning and boundary testing: Input domain partitioning and testing, Simple domain analysis and extreme point combination strategies, Testing strategies based on boundary analysis. (4 Hrs)

MODULE III

Defect prevention and process improvement: Basic concepts and generic approaches, Root cause analysis for defect prevention, Training for defect prevention, Defect prevention techniques. (4 Hrs)

Software inspection: Concepts and generic process, Inspection and related activities, Defect detection techniques, tool/process support effectiveness. (2 Hrs)

Coverage and usage testing based on finite state machines: Finite State Machines (FSM)and testing, FSM testing, FSM based testing of web based applications, Markov Chains and Unified Markov Models (UMM) for testing, Using UMM's for usage based statistical testing, Testing based on Web usages. (5 Hrs)

MODULE IV

Software testing tools and overview: Need for automated testing tools, Taxonomy of testing tools, Functional/Regression testing tools, Performance testing tools, Testing management tools, Source code testing tools, Selection of testing tools. (6 Hrs)

Case study: Overview of WinRunner, LoadRunner, Quick Test Professional and SQA Robot. (5 Hrs)

TEXT BOOKS:

1. Software Quality Engineering – Testing, Quality Assurance and Quantifiable Improvement by Jeff Tian, Edition 2006, ISBN: 81-265-0805-1
2. Software Testing Tools by Dr. K.V.K.K. Prasad.

REFERENCE BOOKS:

1. Effective methods for Software testing by William E. Perry, 3rd edition.
2. Introducing Software testing by Louise Tamares, ISBN: 81-7808-678-6

IT7.1DS DISTRIBUTED SYSTEMS

Lectures per week	: (3 + 1 + 2)
Max marks for theory paper	: 100
Max marks for sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course objectives:

- Present the principles underlying the functioning of distributed systems.
- Create an awareness of the major technical challenges in distributed systems design and implementation.
- Expose students to past and current research issues in the field of distributed systems.
- Provide experience in the implementation of typical algorithms used in distributed systems.

Instructional Objectives:

After completing this course students will be able to:

- Explain what a distributed system is, why you would design a system as a distributed system, and what the desired properties of such systems are.
- List the principles underlying the functioning of distributed systems, describe the problems and challenges associated with these principles, and evaluate the effectiveness and shortcomings of their solutions.
- Recognize how the principles are applied in contemporary distributed systems, explain how they affect the software design, and be able to identify features and design decisions that may cause problems.

MODULE I

Introduction to Distributed System. Goals: Connecting Users and Resources , Transparency, Openness, Scalability. Hardware Concepts: Multiprocessors, Homogeneous Multicomputer Systems, Heterogeneous Multicomputer Systems. Software Concepts: Distributed Operating Systems, Network Operating Systems,

Middleware. The Client-Server Model: Clients and Servers, Application Layering, Client-Server Architectures. (5 Hrs)

Layered Protocols: Lower-Level Protocols, Transport Protocols, Higher-Level Protocols. Remote Procedure Call: Basic RPC Operation , Parameter Passing , Extended RPC Models,

Example: DCE RPC. Remote Object Invocation: Distributed Objects, Binding a Client to an Object, Static versus Dynamic Remote Method Invocations, Parameter Passing, DCE Remote Objects, Java RMI 95. Message-Oriented Communication: Persistence and Synchronicity in Communication, Message-Oriented Transient Communication, Message-Oriented Persistent Communication. Stream-Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization. (5 Hrs)

MODULE II

Processes: Introduction to Threads, Threads in Distributed Systems, Clients, User Interfaces, Client-Side Software for Distribution Transparency. Servers- General Design Issues, Object Servers, Approaches to Code Migration, Migration and Local Resources, Migration in Heterogeneous Systems. D'Agents. Software Agents 173, Software Agents in Distributed Systems, Agent Technology (6 Hrs)
Clock Synchronization: Physical Clocks, Clock Synchronization Algorithms, Use of Synchronized Clocks. Logical Clocks: Lamport timestamps, Vector timestamps. Global State. Election Algorithms, The Bully Algorithm, A Ring Algorithm. Mutual Exclusion: Centralized, Distributed, and Token Ring Algorithms. A Comparison of the Three Algorithms. Distributed Transactions: The Transaction Model, Classification of Transactions, Implementation of Concurrency Control. (4 Hrs)

MODULE III

Introduction to consistency and replication: Reasons for Replication, Object Replication, Replication as Scaling Technique. Data-Centric Consistency Models, Strict, Linearizability and Sequential, Causal, FIFO, Weak, Release, Entry Consistency models: Client-Centric Consistency Models: Eventual Consistency, Monotonic Reads, Monotonic Writes, Read Your Writes, Writes Follow Reads and Implementation. Distribution Protocols: Replica Placement, Update Propagation, Epidemic Protocols, Consistency, Primary-Based, Replicated-Write, Cache-Coherence Protocols. (5 Hrs)

Introduction To Fault Tolerance: Basic Concepts, Failure Models, Failure Masking by Redundancy. Process Resilience: Design Issues, Failure Masking and Replication, Agreement in Faulty Systems. Reliable Client-Server Communication: Point-to-Point Communication, RPC Semantics in the Presence of Failures. Reliable Group Communication: Basic Reliable-Multicasting Schemes, Scalability in Reliable Multicasting, Atomic Multicast. Distributed Commit: Two-Phase Commit, Three-Phase Commit. Recovery: Check pointing, Message Logging. (5 Hrs)

MODULE IV

Distributed Object-Based Systems: Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance and security issues with CORBA and DCOM. Comparison of CORBA and DCOM. (6 Hrs)

Distributed File Systems: Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance and security issues with Sun Network File System, (02 Hrs)

Distributed Document-Based Systems: Communication, Processes, Naming, Synchronization, Caching and Replication, Fault Tolerance and security issues with World Wide Web

TEXT BOOK :

1. Distributed Systems: Principles and Paradigms by Andrew S. Tanenbaum and Maarten van Steen, Prentice Hall, ISBN-81-7808-789-8

REFERENCE BOOKS :

1. Distributed Systems: Concepts and Design - By G.Coulouris, J. Dollimore and T.King Berg., Addison Wesley, ISBN-10-0201619180

IT7.2POC PRINCIPLES OF COMPILERS

Lectures per week	: (3 + 1 + 2)
Max marks for theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

This subject introduces essential theory, algorithms, and tools used in compiler construction. Major topics include lexical, syntax, and semantic analysis of source files, syntax trees, symbol tables, code generation, and optimization techniques.

Instructional Objectives:

After completing this course students will be able to know the major steps involved in compiling a high-level programming language down to a low-level target machine language.

MODULE I

Brief overview of Assemblers, Macro processors, Linkers, Loaders, Debuggers and Text editor. (2 Hrs)
Compilers and translators. Structure of a compiler. Phases of compilation. Bootstrapping and Porting. Compiler-writing tools. (2 Hrs)
The role of a lexical analyser. Design of lexical analyzer. Implementation of lexical analyzer. A Language for specifying lexical analyzer. Study of the features and applications of LEX/FLEX tool. (5 Hrs)

MODULE II

Overview of Context free grammar. Derivations and Parse trees, Ambiguity, Left recursion, Left factoring. Shift-reduce parsers. Operator precedence parsers, LR parsers. (5 hrs)
Recursive descent parsing and Predictive parsers (3 hrs)
Study of YACC Tool: Programming with YACC. Combining YACC and FLEX. (2 hrs)

MODULE III

Intermediate Code Generation: Intermediate Language, Declarations, Assignment statements, Boolean expressions, Case statement, Backpatching, Procedure call. (3 Hrs)

Run Time environments: Source language issues, Storage organization, Storage allocation strategies, Access to non-local names. (3 Hrs)
Symbol tables: The content of a symbol table, Data structures for Symbol Table, Representing scope information. Error detection and recovery: Lexical phase errors, Syntactic phase errors, Semantic errors. (4 Hrs)

MODULE IV

Code generation: Issues in the design of a code Generator, Basic blocks and flow graphs, Next-use information, A simple Code generator, The DAG representation of Basic blocks, Peephole Optimization, Generating code from DAGS. (6 Hrs)
Code optimization: The principle sources of optimization, Optimization of basic blocks, Machine dependent optimization, Register allocation optimization. (4 Hrs)

TEXT BOOKS

1. Principles of Compiler Design by Aho and Ulman, Narosa publishing House, ISBN: 81-85015-61-9.
2. Compilers, Principles, techniques and tools, Aho, Ulman and Sethi, Pearson Education Asia, ISBN: 81-7808-046-X.
3. Compiler design with FLEX and YACC by Vinu V. Das, PHI publication, ISBN:978-81-203-3251-5

REFERENCE BOOKS

1. Compiler Construction, Principles and Practice by Louden, Galgotia Publication, ISBN:0-534-93972-4
2. Theory and Practice of Compiler Writing by P. Trembly, McGraw Hill International Edition, ISBN:0-07-066616-4.
3. Modern Compiler Design by D. Grune, H. Bal C. Jacobs K. Langendoen , Wiley Publication; 1st Edition, ISBN:0471976970
4. Compiler design in C by Holub A I , Prentice-Hall, ISBN:0-87692-778-9
5. lex and yacc by Doug Brown, John Levine, Tony Mason , O'Reilly Media, ISBN:1-56592-000-7.

IT7.3MC MOBILE COMPUTING

Lectures per week	: (3 + 1 + 2)
Max. Marks for Theory paper	: 100
Max. Marks for Sessionals	: 20 + 5
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module).

Course Objectives:

The advent of small, inexpensive, yet powerful portable computers has coincided with the exponential growth of the Internet, making it possible to access computing resources and information at nearly any location at almost any time. This new phenomenon, mobile computing, is poised to become the main technology driver for a decade to come. The objective of this course is to provide valuable insights into the major topics of this emerging discipline.

Instructional Objectives:

There are many challenges that make mobile computing a hot research and development area. This subject explores the benefits and challenges of the field. It provides technical information about all aspects of mobile computing, from basic concepts to research-level material, with learned analysis of future directions.

MODULE I

Medium Access Control: (7 Hrs)

Motivation for a specialized MAC
SDMA, FDMA, TDMA, CDMA
Comparison of S/T/F/CDMA

Telecommunication System: (5 Hrs)

GSM
DECT

MODULE 2

Mobile Network Layer (5 Hrs)

Mobile IP
Dynamic Host Configuration Protocol
Mobile ad-hoc networks

Mobile Transport Layer **(**5 Hrs)

Traditional TCP
Classical TCP improvements
TCP over 2.5/3G wireless networks
Performance Enhancing Proxies

MODULE 3

Multimedia Messaging Service: (6 hrs)
MMS Architecture, MMS Interfaces, Addressing in MMS, Technical Specifications, Supported Formats, MMS Messages. Message Submission, Message Transfer, Delivery Report, Read-Reply Reports, Message Notification, Message Retrieval, Message Forwarding

Location Management Techniques for Mobile Computing Environments: (5 hrs)
Location Management, Location Update, Location Inquiry, Delay Constraint. Location Management Cost, Network Topology. Mobility Pattern: Memoryless (Random Walk) Movement Model, Markovian Model, Cell History, Directional History,Shortest Distance Model,

MODULE 4

Simulation Models and Tool for Mobile Location-Dependent Information Access: (5 hrs)
Spatial Model, Location Models, Spatial Information Models. Mobility: Existing Mobility Models, Random Mobility Models, Advanced Models, Generic Mobility Model. Information Access Model: Zipf Distribution, Location-Dependent Access. A Tool for User Mobility Modeling: Objectives, Software Architecture, Usage.

Securing Mobile Ad Hoc Networks: (6 hrs)
Threats and Challenges, Trust Management. Secure Routing: The Secure Routing Protocol, The Neighbor Lookup Protocol, The Basic Secure Route Discovery Procedure, Priority-Based Query Handling, The Route Maintenance Procedure, The SRP Extension. Secure Data Forwarding, Secure Message Transmission Protocol.

TEXT BOOKS:

1. Mobile Communications by Jochen Schiller, Pearson Education, Second Edition, 2003, ISBN:978-81-317-2426-2
2. Mobile Computing Handbook by Mohammad Ilyas, Imad Mahgoub, CRC Press, Auerbach Publications.

IT7.4.a.DMW DATA MINING & WAREHOUSING (Elective I)

Lectures per week	: (3 + 1 + 2)
Max. Marks for Theory paper	: 100
Max. Marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5(At least one question from each module with two compulsory questions from any one module)

Course Objectives:

The course is designed to introduce the students to the basic concepts and techniques of data mining. Data mining intends to search through data for hidden relationships and patterns. The first half of the course covers various aspects of data mining such as data preprocessing, data modeling, DMQL, the association rules, classification and prediction methods and also the several clustering techniques. The course also includes the several anomaly detection schemes. The later half of the course focuses on data warehousing concepts including the warehousing components and building of a warehouse and OLAP severs. It also introduces the concept of web mining to the students.

Instructional Objectives:

At the end of the course students will be familiar with:

1. Understand data mining fundamentals and mechanisms.
2. Explores data mining techniques to implement data mining algorithms.
3. Learn data warehousing concepts and components.
4. Learn the importance of outlier detection.
5. Learn Web mining.

MODULE 1

Introduction to Data Mining: Basic Data Mining Tasks, Data Mining Functionalities, Data Mining from a Database Perspective, Data Mining Issues. Data Preprocessing: Data Cleaning, Data Integration & Transformation, Data Reduction, Discretization & Concept Hierarchy generation. (3 hrs)

Data Modeling. Data Mining Query Language. (4 hrs)

Data Mining Association Rules. Association Rule Mining. Mining Single Dimensional Boolean Association Rules from Transactional Databases. (3 hrs)

MODULE 2

Introduction to Classification & Prediction: Classification by Decision tree induction, Bayesian Classification, k-Nearest Neighbor Classifier, Introduction to Prediction Concept.

(4 hrs)

Introduction to Cluster Analysis. Types of data in cluster analysis, Clustering Methods, Partitioning Methods, Hierarchical Methods, Density Methods, Grid-Based Methods, Model-Based Clustering Methods. (6 hrs)

MODULE 3

Data Mining Anomaly Detection: Variants of Anomaly/Outlier Detection Problems, Applications. Types of anomaly detection schemes: Graphical & Statistical-based, Distance-based, and Model-based. (3 hrs)

Data Warehousing: Concepts and Mechanisms: Need, Functions & Application. Data Warehousing Components: Overall architecture, Data Warehouse Implementation, Multidimensional Data Model, Efficient Computation of Data Cube, OLTP v/s Data Warehousing. (4 hrs)

Building a Data Warehouse: Planning a Data Warehouse, Conceptual Data Warehouse Modeling. (3 hrs)

MODULE 4

OLAP Servers: Need for OLAP, Multidimensional v/s Multi relational OLAP. Categorization of OLAP tools: MOLAP, ROLAP. OLAP tools & Internet. (2 hrs)

Mapping Data Warehouse to Multiprocessor Architecture: Types of parallelism, Intraquery and Interquery parallelism. Data Partitioning. Database Architecture for parallel processing: Shared memory architecture, Shared disk architecture, Shared nothing architecture and Combined architecture. (3 hrs)

Data Extraction, Cleanup and transformation. Metadata. Query and Reporting tools. Web Data Mining. Web Content Mining: Web documents categorization and clustering. Web Usage Mining: Mining for user behavior on the web, Internet marketing. (5 hrs)

TEXT BOOKS

1. Data mining - Concepts and Techniques -Jiawei Han and Micheline Kamber, Morgan Kuaffman publisher, ISBN:1-55860-489-8
2. Data Warehousing, Data Mining & OLAP – Alex Berson, Stephen J. Smith, TMH publication, ISBN: 0-07-058741-8

REFERENCE BOOKS

1. Introduction to Data Mining with case studies- G.K. Gupta, PHI Publisher, ISBN:81-203-3053-6

2. Mastering Data Mining-Michel. J. A. Berry. Gordon S.Linoff, Wiley Publications, ISBN: 978-0-471-33123-0
3. Data Mining-Pieter Adriaans and Dolf Zantinge.- PEA, ISBN:8178084252

IT7.4.b.GA GENETIC ALGORITHMS (Elective I)

Lectures per week	: (3 + 1 + 2)
Max. Marks for Theory paper	: 100
Max. Marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module).

Course Objective:

The aim of the course is to introduce genetic algorithms and to give students an insight into the various types of algorithms and their industrial applications. The course will help them to be able to assess the suitability of genetic algorithms for specific problems.

Instructional Objective:

To familiarize students with genetic and evolutionary computation techniques and to enable them to read the literature and solve practical problems of their choosing

MODULE I

Introduction to Genetic Algorithms: Robustness of Traditional Optimization and Search Methods, Goals of Optimization, Difference between Genetic Algorithms and Traditional Methods, Simple Genetic Algorithm and its major operators, Example using Genetic Algorithm, Similarity Templates Schemata. (4 hrs)

Mathematical Foundations: Fundamental theorem, Schema Processing, Two-armed and K-armed bandit problem, Building block hypothesis, Minimal deceptive, Similarity templates as hyper planes. (6 Hrs)

MODULE II

Computer Implementation Of Genetic Algorithms: Data structures, Reproduction, crossover and mutation, Mapping objective functions to fitness form, Fitness scaling. (5 hrs)

Applications Of Genetic Algorithms: De Jong and Function optimization, Structural optimization via genetic algorithm, Medical image registration with genetic algorithms, Iterated prisoner's dilemma problem. (5 hrs)

MODULE III

Advanced Operators And Techniques In Genetic Algorithm Search: Dominance, Diploidy and Abeyance, Inversion and other Re-ordering Operators, Macro operators, Niche and Specialization, Multi objective optimization. (5 hrs)

Knowledge based techniques, Genetic Algorithms and Parallel processors, Genetic Based machine learning, Classifier systems. (5 hrs)

MODULE IV

Industrial Application Of Genetic Algorithms: Data Mining using genetic Algorithms
Approaches to search in data mining. (6 hrs)
Genetic Algorithm Specifics. (4 hrs)

TEXT BOOKS:

1. David E.Goldberg, Genetic Algorithms in search, optimization machine leaning Pearson Education,6th Edition ISBN 81-7808-130-X(chapter 1,2,3,4,5,6)
2. Charles L Karr and L.Michael Freeman, Industrial applications of Genetic Algorithms, CRC Press, Washington DC, 1999 (chapter 9), ISBN:0-8493-9801-0

REFERENCE BOOKS:

1. Intelligent agents adaptive control: Industrial applications-L.C.Jain and C.W.de Silva
2. Handbook of Genetic Algorithms -Davis, Lawrence, ISBN:0-442-00173-8.
3. An Introduction to Genetic Algorithms-Melanie Mitchell, ISBN:81-203-1358-5

IT7.4.c.BI BIOINFORMATICS (Elective I)

Lectures per week : (3 + 1 + 2)
Max marks for theory paper : 100
Max marks for sessionals : 20 + 5
Max marks for orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5 (At least one question from each module with two compulsory questions from any one module).

Course Objectives:
The course will introduce the students to the broad scope of bioinformatics, discuss the theory and practice of computational methods, and demonstrate the basic programming tools used in the field of genomics.

Instructional Objectives:
At the end of the course, the students would be familiar with the following:

1. Methods and tools used in bioinformatics
2. Genome Analysis and Gene Mapping
3. Phylogenetic Analysis and Sequence Analysis

MODULE I

Introduction to Bioinformatics: Introduction, Historical Overview and Definition, Bioinformatics applications, Major databases in bioinformatics, Data Management and Analysis, Molecular Biology and Bioinformatics, Central Dogma of Molecular Biology. Information Search and Data Retrieval: Tools for web search, Data Retrieval Tools, Data Mining of biological databases. (4 Hrs)
Genome Analysis and Gene Mapping: Genome Analysis, Gene Mapping, The Sequence Assembly Problem, Genetic Mapping and Linkage Analysis, Physical Maps, Cloning Entire Genome, Genome Sequencing, Applications of Genetic Maps, Sequence Assembly Tools, Identification of Tools in Contigs, Human Genome Project. (6 Hrs)

MODULE II

Alignment of Pairs of Sequences: Biological Motivation of alignment problems, Methods of sequence alignments, Using scoring Matrices, Measuring sequence detection efficiency. (3 Hrs)
Alignment of Multiple Sequences and Phylogenetic Analysis: Methods of multiple sequence alignment, Evaluating multiple alignments, Applications, Phylogenetic Analysis, Methods of Phylogenetic Analysis, Tree evaluation, Problems in Phylogenetic Analysis, Dual automated tools. (4 Hrs)

Tools for Similarity Search and Sequence Alignment: Working with FASTA, Working with BLAST, Filtering and Gapped BLAST, FASTA and BLAST algorithm comparison. (3 Hrs)

MODULE III

Profiles and Hidden Markow Models: Using Profiles, Hidden Markow Models. (2 Hrs)
Gene Identification and Prediction: Basics of Gene Prediction, Pattern Recognition, Gene Prediction methods, Other Tools (3 Hrs)
Gene Expression and Microarrays: Working with DNA Microarrays, Clustering Gene Expression Profiles, Data sources and tools for microarrays analysis, Applications – Functional Genomes, Comparative Genomics, Medical Applications, Microarrays in Pharmaceutical industries, DNA Microarrays. (5 Hrs)

MODULE IV

Protein Classification and Structure Visualisation: Overview of protein structure, Protein Structure Visualisation, Structure based protein classification, Protein Structure databases, Protein Structure Visualisation Database and Tools, Protein Structure Alignment, Domain Architecture Databases, Tools for Plotting Protein-Ligand Interaction, Protein Classification Approach. (6 Hrs)
Introduction to Drug Discovery: Areas influencing drug discovery, Pharmacogenetics and Pharmacogenomics applications, Analysis of Single Nucleotide Polymorphism, Important parameters in Drug Discovery. (4 Hrs)

TEXT BOOKS:

1. Bioinformatics – Methods and Applications, S.C. Rastogi, N. Mendiratta and P. Rastogi, 3rd Edition, PHI, ISBN: 8120325826 ISBN-13: 9788120325821, 978-8120325821

REFERENCE BOOKS:

1. Bioinformatics- A Beginner's Guide, Jean-Michel Claveriw, Cerdric Notredame WILEY dreamlech India Pvt. Ltd, ISBN:81-265-0380-7
2. Introduction to Bioinformatics, Arthur M. Lesk, OXFORD publishers (Indian Edition) ISBN-10: 0199251967 ISBN-10: 0199251967
3. Introduction to Bioinformatics, T K Attwood & D J Parry-SmithAddison Wesley Longman, ISBN 0 582 327881

IT7.4.d.ECOM E – COMMERCE (Elective I)

Lectures per week : (3 + 1 + 2)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5 (At least one question from each module with two compulsory questions from any one module).

Course objective:

This goal of this course is to teach students how to conduct business online and how to manage the technological issues associated with constructing an electronic-commerce Web site. It also examines strategies and products available for building electronic-commerce sites.

Instructional objective:

Upon successfully completing the course, the student should:

- Identify the steps to develop an e-commerce Web site based on information architecture
- Be able to explain the methods to establish and retain customers in e-commerce

MODULE I

Introduction to Electronic Commerce: Defining Electronic Commerce, Brief History of Electronic Commerce. Forces Fueling Electronic Commerce: Electronic Forces, Marketing and Customer Interaction Forces, Technology and Digital Convergence, Implications of Various Forces.Electronic Commerce Industry Framework. The Information Superhighway, Multimedia Content and Network Publishing, Messaging and Information Distribution, Common Business Services Infrastructure, Other Key Support Layers.Types of Electronic Commerce. (6 Hrs)

World Wide Web--Concepts and Technology: Key Concepts behind the Web, Overview of the Web's Technical Architecture, Web and Database Integration, Web Database Products, HTML Forms and CGI Programs. Web Software Developmental Tools. (4 Hrs)

MODULE II

Electronic Payment Systems: Overview of the Electronic Payment Technology. Electronic or Digital Cash, Electronic Checks, Online Credit Card-Based Systems, Other Emerging Financial Instruments, Consumer, Legal, and Business Issues. (5 Hrs)

Electronic Commerce and Banking: Changing Dynamics in the Banking Industry, Banking via Online Services, Open versus Closed Models, Management Issues in Online Banking, Differentiating Products and Services, Managing Financial Supply Chains, Pricing Issues in

Online Banking, Marketing Issues: Attracting Customers, Marketing Issues: Keeping Customers, Back-Office Support for Online Banking. (5 Hrs)

MODULE III

Electronic Commerce and Retailing. Changing Retail Industry Dynamics, Mercantile Models from the Consumer's Perspective, Management Challenges in Online Retailing. (4 Hrs)

Electronic Commerce and Online Publishing: Online Publishing Strategies, Online Publishing Approaches, Edutainment = Education + Entertainment, Online Publishing Success Stories, Advertising and Online Publishing, An Online Publishing Missing Piece: Measurement, Digital Copyrights and Electronic Publishing, Online Copyright Protection Methods. (4 Hrs)

Intranets and Supply-Chain Management: Supply-Chain Management Fundamentals, Pull versus Push Supply-Chain Models, Elements of Supply-Chain Management, Integrating Functions in a Supply Chain, Managing Retail Supply Chains, The Order Management Cycle (OMC), Supply-Chain Application Software,Software for Supply-Chain Management. (3 Hrs)

MODULE IV

Intranets and Customer Asset Management: Challenges in Implementing Customer Asset Management, Customer Asset Management and Supply Chains, Online Sales Force Automation: Elements of Online Sales Automation, Intranets and Sales Automation, Management issues. Online Customer Service and Support: The Web and Customer Service, The Role of Technology in Customer Service. Technology and Marketing Strategy, Marketing Decision Support Systems, Marketing Decision Support Applications. (6 Hrs)

Intranets and Corporate Finance, Understanding the Different Software Modules, Transaction Accounting and Electronic Commerce, Financial Analysis and Management Accounting, Inventory Accounting,

Human Resources Management Systems, HRMS Functions, Size/Structure of Financials Software Market. (4 Hrs)

TEXT BOOK:

1. E-Commerce, Ravi Kalakota & Andrew B, Whinston, Pearson Education India ISBN: 81-7808-158-X.

REFERENCE BOOK:

1. E-Business (R) Evolution by Daniel Amor (Pearson Education), ISBN: 981-405-826-2.

IT7.5.a.GIS GEOGRAPHICAL INFORMATION SYSTEM (Elective II)

Lectures per week : (3 + 1 + 0)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5 (At least one question from each module with two compulsory questions from any one module).

Course Objective:

To learn and understand the various concepts of geographical information systems Starting from fundamentals the course helps to understand maps and way it is represented in digital form. Further in the course the quality of the data is discussed and also different ways of processing of GIS related data is covered. Finally,

Instructional Objective:

On completion of this course students will understand what a Geographic Information System is. They will first understand maps and related terminology that will help them to understand GIS data. They will also learn how GIS data is digitally represented and how the data is processed. The students will gain the knowledge of implementing a GIS and will understand applications of GIS with case studies.

Module I

Introduction to Geographic Information System: Definition of GIS and related terminology, The evolution of GIS, Components of GIS. (2 Hrs)

Maps and GIS: Map Scale, Classes of Maps, Mapping Process, Plane Coordinate System and Transformations, Geographical Coordinate System of Earth, Georeferencing, Topographic Mapping. (6 Hrs)

Uses of Geographical Information System, Technologies and Trends of GIS. (2 Hrs)

MODULE II

Digital Representation of Geographic data: Technical issues pertaining to digital representation of Geographic data, Database and database management system, Raster geographic data representation, Vector data representation, Object oriented geographic data representation, Relationship between data representation and data analysis in GIS. (5 Hrs)

Data Quality and Data Standards: Concepts and definition of Data Quality, Components of geographic Data Quality, Assessment of Data Quality, Managing Spatial Data Standards, Geographic Data standards and GIS Development, (5 Hrs)

MODULE III

Raster Based Data Processing: Acquiring and handling raster Geographic Data, Raster based GIS data Analysis, Output functions of raster data processing, Cartographic Modeling, (4 Hrs)

Vector Based Data Processing: Characteristics of Vector based GIS data processing, Vector data input functions, Non – topological GIS analysis functions, Feature based topological functions, Layer based topological functions, Vector topological functions, Vector based output functions, Application Programming. (6 Hrs)

MODULE IV

GIS Implementation and project Management: Software engineering as applied to GIS, GIS project Planning, System analysis and User requirements studies, Geographic database design methodology, System implementations in technology roll out, System maintenance and Technical Support. (5 Hrs)

GIS Issues and Prospects: Issues of implementing GIS, The trends of GIS development. (3 Hrs)

Case Studies: A case study in GIS Implementation: Clinton Towship, MI. A case study in GIS Implementation: Prince William County, VA. (2 Hrs)

TEXT BOOKS:

1. Concepts And Techniques Of Geographic Information Systems by C. P. Lo; Albert K. W. Yeung, , 2002 Edition, Prentice Hall of India, ISBN:81-203-2230-4

REFERENCE BOOKS:

1. An Introduction to Geographical Information Systems (2nd Edition) By Ian Heywood, Sarah Cornelius, Steve Carver, Pearson Education, ISBN:81-7808-982-3
2. The GIS Book by George B. Korte, 5th Edition Onward Press, ISBN:0-7668-2820-4.
3. Introduction to Geographical Information Systems by Kang – tsung Chang, 2002 Edition, Tata McGraw Hill, ISBN:0-07-049552-1

IT7.5.b.CLCF CYBER LAW AND COMPUTER FORENSICS (Elective II)

Lectures per week : (3 + 1 + 0)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5 (At least one question from each module with two compulsory questions from any one module).

Course Objectives:

Cyber law describes the legal issues related to use of inter-networked information technology. While grounded in real individuals, physical computers and other electronic devices, the Internet is independent of any geographic location. Hence the laws should be fundamentally different from laws that govern geographic nations today. This course would therefore familiarize students with cyber law applicable to India and also the involved investigation process through forensic study.

Instructional Objectives:

At the end of the course, the students would be familiar with the following:

- Cyber Crimes and jurisdiction in the cyber world
- IT Contracts and Copyright Protection
- Forensic Process and Investigation

MODULE I

Power of Arrest without Warrant under the IT Act, 2000: A Critique: Section 80 of the IT Act 2000, Forgetting the line between Cognizable and Non-Cognizable Offences, Necessity of Arrest without warrant from any place, public or otherwise. Cyber Crime and Criminal Justice: Concept of Cyber Crime and the IT Act 2000, Hacking, Teenage web vandals, Cyber fraud and cyber cheating. Virus on the Internet. Defamation, harassment and E-mail abuse, Monetary penalties, adjudication and appeals under IT Act 2000, Nature of cyber criminality, strategies to tackle cyber crime and trends, Criminal justice in India and Implications on Cyber crime. (4 Hrs)

Contracts in the Infotech World: Contracts in the Infotech world, Click-wrap and Shrink-wrap contracts, Contract formation under the Indian Contract Act 1872, Contract formation on the Internet, Terms and Conditions of Contracts, Software product license. (3 Hrs)

Jurisdiction in the Cyber World: Civil law of Jurisdiction in India, Cause of action, Jurisdiction and the Information Technology Act 2000, Place of cause of action in contractual and IPR disputes, Exclusion clauses in Contracts, Abuse of exclusion clauses. (3 Hrs)

MODULE II

Battling Cyber Squatters and Copyright Protection in the Cyber World: Concept of Domain name and reply to Cyber Squatters, Battle between freedom and control on the internet, Works in which copyright subsists and meaning of Copyright, Copyright Ownership and Assignment, License of Copyright, Copyright term and respect for foreign works, Copyright Infringement, Remedies and Offences, Copyright protection of content on the Internet, Copyright notice, disclaimer and acknowledgment, Napster and its Cousins, Computer Software Piracy. (5 Hrs)

Digital signatures, Digital Signature Certificate, Certifying Authorities and Liability in the Event of Digital Signature Compromise, E-Governance in India. The Indian Evidence Act of 1872 v/s Information Technology Act, 2000: Status of Electronic Records as Evidence, Proof and Management of Electronic Records, Proving Digital Signature, Proof of Electronic Agreements, Proving Electronic Messages, Other Amendments in the Indian Evidence Act by the IT Act. (5 Hrs)

MODULE III

Protection of Cyber Consumers in India: Goods and Services, Consumer Complaints, Defect in Goods and Deficiency in Services, Restrictive and Unfair Trade Practices, Instances of Unfair Trade Practices, Relief under CPA, Consumer Foras, Jurisdiction and Implications on Cyber Consumers in India. (5 Hrs)

The Forensics Process: Types of Investigations, The Role of the Investigator, Elements of a Good Process, Defining a Process. Forensic Lab Environment Preparation: The Ultimate Computer Forensic Lab, Forensic Computers, Forensic Hardware and Software Tools, The Flyaway Kit, Linux Vs Windows. (5 Hrs)

MODULE IV

Forensically Sound Evidence Collection- Collecting Evidence from a Single System, Common Mistakes in Evidence Collection. Remote Investigations and Collections- Privacy Issues, Remote Investigations, Remote Collections, Encrypted Volumes or Drives, USB Thumb Drives. (3 Hrs)

Forensic Investigation Techniques: Microsoft Windows Systems Analysis, Windows File Systems, Recovering Deleted Files, Windows Artifacts. The Linux File System, Linux Analysis. Defeating Anti-Forensic Techniques: Obscurity Methods, Privacy Measures (5 Hrs)

E-mail Analysis: Finding E-mail Artifacts, Client-Based E-mail, Web-Based Email, Investigating E-Mail Headers. Documenting the Investigation: Read Me, Internal Report, Declaration, Expert Report. (2 Hrs)

TEXT BOOKS:

1) Cyber Law Simplified, Vivek Sood, Tata McGraw-Hill, ISBN 0-07-043506-5.

2) Hacking Exposed™ Computer Forensics Secrets & Solutions, Chris Davis, David Cowen & Aaron Philipp, Tata McGraw-Hill Publishing Company Limited, ISBN 0-07-059895-9

IT7.5.c.FE FINANCIAL ENGINEERING (Elective II)

Lectures per week	: (3 + 1 + 0)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module).

Course Objectives:

The course presents an introduction to financial engineering and some important derivative securities traded in the financial markets including forwards, futures, swaps and options and their risk management techniques.

Instructional Objectives:

The goal of the course is to show how students can utilize capital markets technology to create value. The course would explore how new financial technologies can be used to

1. Manage financial risks and position firms to exploit strategic opportunities;
2. Lower firms' financing costs

MODULE I

An Introduction to Financial Engineering: Scope of Financial Engineering, Tools of Financial Engineering, Financial Engineering versus Financial Analysis, The Financial Engineering Team, Productizing the solution, Career Opportunities for Financial Engineers. (5 Hrs)

Factors Contributing to the growth of financial Engineering: The Environmental factors, Intra-firm Factors, Innovative products of the last twenty years, The changing face of security Industry. The Knowledge Base of the Financial Engineer: Theory, Modeling skills, Product Knowledge, Knowledge of relevant Technology, Accounting Tax and Legal. (5 Hrs)

MODULE II

Valuation Relationships and Applications: Cash Flows, Time Value, Sensitivity Analysis of Time Value, Applications, Spreadsheets, Compounding, Absolute Valuation Versus Relative Valuation. Measuring Return: Utility, Measuring Return: Profit versus rate, Rates of return - before and after taxes, Rates of return and Compounding, Investment Horizons. (4 Hrs)

Risk: Portfolio Considerations, investment Horizons Leverage: Volatility: The Source of price risk, Expressing Price Risk in Percent Form, The mathematics of Portfolio Analysis, Risk Aversion and Portfolio Analysis, Role of The Investment Horizon(The Time Dimension), Elements of Multiperiod Model, The Multiperiod Efficient Set. An Intuitive Demonstration of the Importance of the Investment Horizon. Drawdown Criterion: The Optional Portfolio in the Absence of a Riskless asset, The Riskless Assets, Long and Short Positions and the Role of Leverage. Measuring Risk: Advanced Topics: Measuring exposure of Price Risk, Managing Risk. (6 Hrs)

MODULE III

The Physical Tools of the Financial Engineer: Product Development, Products Defined, A Model for New Product Development, Instrument Preview. Futures Forwards, Forward rate Agreements(FRA's), FRA's and Swaps. (5 Hrs)

Rate Conversion, The structure of a swap, Interest rate Swaps, Currency Swaps , Commodity Swaps, Variants, Swap Dealers Role. Single Period Options: Calls and Puts, Payoff Profiles, Hedging with options, Cash Settled Options. (5 Hrs)

MODULE IV

Financial Engineering Processes and Strategies: Assets/Liability management, The Evolution of assets/Liability Management, The Foundation Concept , The changing Face of Liquidity Management, Margin Management, The Investment banker in Asset/Liability Management. Hedging and Related Risk Management Techniques: Hedge Ratios and Their Uses, Recent Improvements in Hedging Theory, The Cost of Hedging, The building Block Approach to hedging, Miscellaneous Risk Management Issues and Instruments. (5 Hrs)

Corporate Restructuring and the LBO: Corporate Restructuring, Going Private: The Leveraged Buyout, The Typical Leveraged Buyout, The Investment Bank in an LBO : The Finance Engineer at Work. Arbitrage and Synthetic Instruments: Arbitrage : Form the Ancient to the Modern, Synthetic Securities, Synthesizing Derivatives, The Cash and carry synthetic, cash and Carry in Arbitrage: Enhancing Portfolio Return, Creating Synthetic Long Bonds, Using Swaps to synthesize Positions, Qualitative Differences Between Synthetic and Real Securities. (5 Hrs)

TEXT BOOK :

1. Financial Engineering A Complete Guide to Financial Innovations By John F. Marshall and Vipul K. Bansal, Prentice Hall of India, ISBN: 81-203-1013-6.

IT7.5.d.ITBM IT BUSINESS METHODOLOGY (Elective II)

Lectures per week : (3 + 1 + 0)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5 (At least one question from each module with two compulsory questions from any one module).

Course Objectives:

- The objective of the course is to explain the main concepts and issues related to business management in the Information Technology field. The activities will be studied in the form of processes describing workflows, and their operation using conceptual models and tools typical of computer science.
- The major goal is to help students acquire the basic understanding of the major enterprise wide business processes and their integration through IT enabled applications, and to develop a managerial perspective to leverage them for competitive advantage.

Instructional Objectives:

At the end of this course, students will be familiar with the technical terminology of the area, based on several models that can be used to structure and compose business processes from the managerial perspective. Moreover, they will be encouraged to experiment with some advanced tools for the design and analysis of these processes in Information Technology.

MODULE I

Management Information Systems: Need, Role of managers, Business and technology trends, Re-engineering. Transaction Management and E-commerce: Data Capture, EDI, Electronic and mobile commerce, Payment mechanisms, Data Quality, Accounting. (4 Hrs)
Models and Decision Support: Need, Understanding processes, Decision Support Systems (DSS), examples, Executive Information Systems (EIS), Geographical Information Systems (GIS). Complex Decision Support and Expert Systems: Specialized problems, Expert Support Systems (ESS), Building ESS, Knowledge, Management, AI Systems, Importance of Intelligent Systems (6 Hrs)

MODULE II

Strategic Analysis: Competitive environment, External agents, IS techniques to gain competitive Advantage, Need for innovation, Costs and dangers of strategies, Quality management: Operations, tactics and strategy. Organizing Businesses and Systems: Production Chain, Entrepreneurship, Planning. (4 Hrs)

Systems Development: Building Information Systems, SDLC, System analysis, Process analysis. Information management and Society: Individual perspective, Business perspective: Vendor, Consumer, Education and training, Social interaction, Responsibility and ethics. (6 Hrs)

MODULE III

Introduction to Enterprise Resource Planning: Evolution of Enterprise applications, Reasons for the growth of the ERP market advantages of Enterprise Wide Applications, ERP package failure and use. Enterprise - An Overview: Integrated management information, Business modeling, Integrate business model. ERP and Related technologies: BPR, MIS, DSS, EIS, Data warehousing, Data mining, OLAP, Supply Chain Management. (6 Hrs)
ERP : A Manufacturing Perspective: ERP, CAD/CAM, MRP,BOM, closed loop MRP, MRP-II, DRP, JIT and Kanban, CAD/CAM, PDM, MTO and MTS, ATO, ETO, CTO. (4 Hrs)

MODULE IV

ERP Modules: Finance, Plant management, Quality management, Materials management. Benefits of ERP: Reduction of lead time, On-time shipment, Reduction in cycle time, Improved resource utilization, Better customer satisfaction, Improved supplier, Performance, Increase flexibility, Reduced quality costs, Improved information, accuracy and decision making capability. (5 Hrs)
ERP Implementation Lifecycle: Pre-evaluation screening, Package evaluation, Project planning phase, Gap analysis, Reengineering, Configuration, Implementation team engineering, Testing, Going live, End-user training, Post implementation. Vendors, Consultants and users**:** in-house implementation, Vendors, Consultants, End-users. (5 Hrs)

TEXT BOOKS:-

1. Management Information Systems By Gerald V. Post and David L. Anderson (TMH), ISBN: 0-07-049940-3
2. Enterprise Resource Planning By Alexis Leon, TMH, ISBN: 0-07-463712-6

REFERENCE BOOKS:-

1. Information System for Modern Management By Robert G. Murdick, Joel E. Ross and James R. Claggett (PHI), ISBN: 81-203-0397-0.
2. Management Information Technology in the E-business Enterprise by James A. O'Brien, Irwin McGraw Hill, ISBN: 0-07-115811-1
3. Enterprise Resource Planning by Vinod Kumar Garg & N. K. Venkita Krishna, PHI, ISBN: 81-203-1436-0

IT8.1IPPR IMAGE PROCESSING AND PATTERN RECOGNITION

Lectures per week : (3 + 1 + 2)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

The goal of this course is to provide an introduction to basic concepts and methodologies in digital image processing, and to develop a foundation that can be used as the basis for further study and research in image processing.

Instructional Objectives:

Upon successfully completing the course, the student should:

1. Have a fundamental understanding of digital image processing techniques, including image enhancement, restoration, compression and segmentation.
2. Be able to implement basic image processing algorithms
3. Have the skill base necessary to further explore advanced topics of Digital Image Processing.

MODULE I

Introduction to Digital Image Processing. Fundamental Steps in Digital Image Processing, Components of an Image Processing System. Digital Image Fundamentals: Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels. (5 Hrs)

Image Enhancement in the spatial domain: Background, Some Basic Intensity Transformation Functions, Histogram Processing , Histogram Equalization, Histogram Matching (Specification), Enhancement using arithmetic/logic operations, Basics of Spatial filtering, Smoothing Spatial Filters, Sharpening Spatial Filters. (5 Hrs)

MODULE II

Image Enhancements in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain. Smoothing Frequency Domain Filters: Ideal Lowpass Filters, Butterworth Lowpass Filters, Gaussian Lowpass Filters. Sharpening Frequency Domain

Filters: Ideal Highpass Filters, Butterworth Highpass Filters, Gaussian Highpass Filters. Properties of 2-D FT, Convolution and Correlation theorems. (5 Hrs)
Image Restoration: A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise, Mean Filters, Order-Statistics Filters, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering. (5 Hrs)

MODULE III

Color Image Processing: Color Fundamentals, Color Models, Basics of Full-Color Image Processing. Color Transformations: Formulation, Color Complements, Color Slicing, XTone and Color Corrections, Histogram Processing. Smoothing and Sharpening: Color Image Smoothing, Color Image Sharpening. Morphological Image Processing : Preliminaries, Erosion and Dilation, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms. (5 Hrs)

Image Segmentation: Detection of Discontinuities. Edge Linking and Boundary Detection. Local Processing, Global Processing via the Hough Transform. Thresholding : Basic Global Thresholding, Basic Adaptive Thresholding, Optimal Global and Adaptive Thresholding, Region-Based Segmentation. (5 Hrs)

MODULE IV

Representation and Description: Boundary Descriptors , Some Simple Descriptors, Shape Numbers, Fourier Descriptors, Statistical Moments. Regional Descriptors: Some Simple Descriptors, Topological Descriptors. (5 Hrs)

Object Recognition: Patterns and Pattern Classes. Recognition Based on Decision-Theoretic Methods, Matching, Optimum Statistical Classifiers. Structural Methods: Matching Shape Numbers, String Matching, Syntactic Recognition of Strings. (5 Hrs)

TEXT BOOKS

1. Digital Image Processing - By R.C. Gonzalez and R.E. Woods, Second Edition, Addison Wesley, ISBN: 81-7808-629-8.

REFERENCE BOOKS

1. Fundamentals of Digital Image Processing - By A.K.Jain, PHI, ISBN: -81-203-0929-4
2. Digital Image Processing - By W.K.Pralt, McGraw Hill, ISBN: 9-814-12620-9

3. Image Processing, Analysis and Machine Vision by Milan Sonka, Vaclav Hlavac, Roger Boyle, ISBN: 981-240-061-3

IT8.2CCNS COMPUTER CRYPTOGRAPHY AND NETWORK SECURITY

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

In this course, the students will learn about various cryptographic techniques and their applications.

Instructional Objectives:

After learning this course the student will be able to know about cryptography, Symmetric and Asymmetric Encryption, Substitution and transposition techniques, Message authentication and Hash Functions, Digital Signatures, Web security, Electronic mail Security, Authentication applications and Firewalls.

MODULE I

Services, Mechanisms and Attacks. OSI Security Architecture, Model for Network Security. Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography. (6 Hrs)

Intruders, Intrusion Detection, Password Management, Malicious Software: Viruses and Related Threats, Virus Countermeasures. (4 Hrs)

MODULE II

Block Ciphers Principles, Data Encryption Standard, Strength of DES, Block Cipher Modes of Operation, Triple DES. (5 Hrs)

Confidentiality Using Symmetric Ciphers, Placement of Encryption Function, Traffic Confidentiality, Key Distribution. Introduction To Number Theory: Fermat's and Euler's Theorem, Chinese Remainder Theorem, Discrete Logarithms. (5 Hrs)

MODULE III

Public Key Cryptography: Principles of Public Key Cryptosystems, RSA Algorithm. Key Management, Diffie-Hellman Key Exchange. (5 Hrs)

Message Authentication And Hash Functions: Authentication Requirements, Authentication Functions. Hash Algorithms: MD5 Message Digest Algorithm, Overview of Secure Hash Algorithm. Digital Signatures: Digital Signature Standard. (5 Hrs)

MODULE IV

Authentication Applications: Kerberos, X.509 Authentication Service. (3 Hrs)

Electronic Mail Security: Pretty Good Privacy, S/MIME. (2 Hrs)

Brief overview of IPSec and SSL/TLS. (2 Hrs)

Secure Electronic Transaction, Firewall Design Principles. (3 Hrs)

TEXT BOOK:

1. Cryptography And Network Security By William Stallings, 4th Edition, Prentice Hall Of India, ISBN:81-203-3018-8 OR

   Pearson Education, ISBN: 978-81-7758-774-6

REFERENCE BOOKS

1. Cryptography And Network Security By Behrouz A. Forouzan, Tata McGraw Hill, ISBN-13:978-0-07-066046-5, ISBN-10:0-07-066046-8
2. Cryptography And Network Security By Atul Kahate, Tata McGraw Hill, ISBN-13:978-0-07-064823-4, ISBN-10:0-07-064823-9.

IT8.3.a.WS WEB SERVICES (Elective III)

Lectures per week : (3 + 1 + 2)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

The course gives a good overview of the various standards and techniques that exists in the Web service landscape. Major topics include some of the Web services open industry standards such as XML, SOAP, UDDI, WSDL, WSCL, and BPEL.

Instructional Objectives:

1. To know the fundamentals of XML
2. To understand SOAP protocol.
3. To Generate, read and understand the WSDL, WSCL, BPEL files.
4. To Understand Web service security issues

MODULE 1

Introduction and apllications of web services. Web services and Enterprises. (3 Hrs)
Web Services architecture: concepts and relationships, Stakeholder's Perspectives(4 Hrs)
Web Services Architecture Usage Scenarios. Use Cases. Web Service Management: Service Life Cycle (3 Hrs)

MODULE 2

XML Fundamentals. XML, XML Documents, XML Namespaces. (3 Hrs)
XML Schema (3 Hrs)
Processing XML. XML Parsing: SAX, COM, JAXB. Xpath, XQuery. (4 Hrs)

MODULE 3

SOAP: The SOAP model, SOAP,SOAP Messages, SOAP Encoding, SOAP RPC, Using Alternative SOAP Encoding, Document, RPC, Literal, Encoded. (4 Hrs)
WSDL: Using SOAP and WSDL. (3 Hrs)
UDDI: UDDI at a glance, The UDDI Business registry, UDDI under covers, Accessing UDDI, How UDDI is Playing out. (3 Hrs)

MODULE 4

Conversations: Web service conversation Language, WSCL Interface component, Relationship between WSCL and WSDL. (2 Hrs)
Workflow: Business Process Management, Workflow and workflow Management systems, Business Process Execution Language (BPEL). (3 Hrs)
Security: Everyday Security Basics, Security Is An End-to-End Process, Web Service Security Issues, Types of Security Attacks and Threats, Web Services Security Roadmap, WS-Security. (3 Hrs)
Case Study: JAVA Web Service, .NET Web Service. (2 Hrs)

TEXT BOOKS

1. Developing Enterprise Web Services – An Architect's Guide, Sandeep Chatterjee, James Webber, Pearson Education, ISBN: 0-13-140160-2
2. Web Services: A Technical Introduction by Harvey M.Dietel & Paul J.Dietel, Prentice Hall PTR, ISBN: 0130461350

REFERENCE BOOKS

1. Understanding Web services XML, WSDL, SOAP and UDDI by Newcomer E, Pearson Education India, ISBN: 81-7808-704-9
2. XML and Web Services by Scmeizer R, Pearson Education, ISBN: 81-7808-759-6
3. XML, Web Services and the Data Revolution by Coyle F.P, Pearson Education Asia, ISBN: 81-7808-628-X
4. Java Web Services- David A.Chappel, O'Reilly Publication, ISBN: 0-596-00269-6
5. Web services Essentials- Cerami, O'Reilly, ISBN: 0-596-00224-6
6. Programming .NET Web Services by Ferrara A., MacDonald M., O'Reilly, ISBN: 81-7366-438-2

Additional References

1. W3C Documentation on Web Services
   a) Web Services Architecture http://www.w3.org/TR/ws-arch/
   b) Web Services Architecture Usage Scenarios http://www.w3.org/TR/ws-arch-scenarios/
   c) Web Service Management: Service Life Cycle http://www.w3.org/TR/wslc/

2. W3School Online Web tutorial: http://www.w3schools.com/

IT8.3.b.OR OPERATION RESEARCH (Elective III)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objective:

To understand the computer oriented approach in problem solving with the important methods of Operations Research in solving realistic problems. To study the models involving optimum decision making.

Instructional Objectives:

Students on completion of this course will know to apply the following techniques in solving real-life problems: Linear Programming, Integer Programming, Dynamic Programming, Branch and Bound Techniques, Sequencing problems, Queuing theory, Network Models.

MODULE 1

Introduction to OR, Classification of problems in Operations Research, Mathematical Modelling in Operations Research. (2 Hrs)

Introduction to Linear Programming, Formulation of Linear Programming models, Graphical Solutions of Linear Programming models, Maximization and Minimization of functions with constraints, Simplex method, Transportation problems, Assignment problems. (8 hrs)

MODULE 2

Introduction to Integer Programming, Implicit Enumeration Algorithm for 0-1 integer programming problems, Cutting plane technique. (5 Hrs)
Branch and Bound Algorithm for Assignment problems, Branch and Bound Algorithm for Travelling Salesman problem , Branch and Bound Algorithm for Integer Programming.

(5 Hrs)

MODULE 3

Introduction to Dynamic Programming, Investment problems, Stage-coach problem, Production Scheduling, Knapsack problem. (6 Hrs)

Introduction to Sequencing problems: N-job two machine sequencing problem, N-job three machine sequencing problem. (4 Hrs)

MODULE IV

Introduction to PERT, PERT network, Time estimates for activities, Critical Path, Probability of completing event on schedule. (5 Hrs)

Queuing Theory: Notations and Assumptions, Queuing Models with Poisson Input – Exponential service, Queuing Models with Poisson Input –Arbitrary service time. (5 Hrs)

TEXT BOOKS :

1. Introduction to Operations Research: A Computer Oriented Algorithm Approach - By Billey E. Gillett, TMH, ISBN:0-07-099319-X

REFERENCE BOOKS :

1. Operations Research - H.A. Taha ,PHI, (6^{th} Edition), ISBN: 81-2003-1222-8
2. Operations Research - Fredericks ,Hiller and Liberman ,TMH, ISBN: 0-07-047387-0
3. Operations Research – Theory and Applications – J. K. Sharma, MacMillan India Ltd., ISBN: 0333 939204

IT8.3.c.DPF DESIGN PATTERNS AND FRAMEWORKS (Elective III)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives: The Course will provide the student with an in depth knowledge of the various Design Patterns used in Software Engineering.

Instructional Objectives:

At the end of this course, the students will gain practical knowledge of different design patterns and their use in J2EE and .NET frameworks.

MODULE I

Introduction to Design Pattern: Describing Design Patterns, Organizing One Catalog, How to Design Patterns solve Design Problems, How to select a Design Pattern, How to Use a Design Pattern. Design Problems: Document Structure, Formatting, Embellishing the User-Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation. (4 Hrs)

Design Pattern Catalog**:** Creational Patterns, Abstract Factory, Builder, Factory Method, Prototype, Singleton. (6 Hrs)

MODULE II

Structural Patterns: Adapter, Composite, Fly weight. (4 Hrs)

Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator. **(**6 Hrs)

MODULE III

J2EE Servlets, Java Server Pages: J2EE Specification, Developing J2EE Applications, The Model View Controller (MVC) Business Development Model. (3 Hrs)

Enterprise Java Beans, Interfaces and JDBC Persistence: EJB Interfaces, Exploring Implementation Classes, EJB from Client Perspective, Examining How EJB Systems Function. (3 Hrs)

Microsoft .NET Internal Inter operability. .NET Language Integration Components: Defining key .NET Objectives, . NET Role in Windows Family, Examining the .NET framework, Reflection, Understanding the common type specification, Examining the Common Language Specification, Creating a Strong Name,Locate on Assembly. (4 Hrs)

MODULE IV

ASP .NET Architecture: ASP .NET Name spaces, ASP .NET Page Class, Defining Web Form Functionality, Creating User Control, Error Handling and Security. (3 Hrs)

Applying best practices: Examining the Container's Role, Separating Business logic from presentation, Use ASP.NET Code Behind Feature, Maximize benefits from both Thin-Client and Rich-Client Applications where applicable, Client-side session state, Using hidden fields, Rewriting URLs, Using Cookies, Using the HTTP Session Interface in J2EE, Using HTTP Application State Class, Synchronizing Access to Application State, Using ASP.NET Session State, Enabling Session State, Storing Session State In-Process and Out-of-Process, Securing an Enterprise Application. (7 Hrs)

TEXTBOOKS:

1. Design Patterns- Elements of Object Oriented Software by Eric Gamma, Richard Helm, Ralph Johnson & John Ulissides, Pearson Education Asia, ISBN: 8178081350
2. .NET & JZEE Interoperability by Dwight Peltzer, Tata Mc Graw Hill Edition, ISBN: 0-07-058688-8

IT8.3.d.FLNN FUZZY LOGIC AND NEURAL NETWORKS (Elective III)

Lectures per week : (3 + 1 + 2)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:
The aim of the course is to introduce Neural Networks and Fuzzy Logic and to understand the applications of Neural Networks and Fuzzy Logic.

Instructional Objectives:
The objective is to provide a simplified yet comprehensive description of the concepts and the potential applications of neural networks and fuzzy logic, to give an insight into fuzzy neural networks and to demonstrate their applicability through examples.

MODULE I

History of Neural Networks. Structure and function of a single neuron. Neural Net Architecture. Neural Learning. Common usage of neural networks in classification, clustering, vector quantization. pattern association, function approximation and forecasting. Evaluation of networks. Implementation of neural networks. (3 hrs)
Perceptrons. Linear Separability Perceptron Training Algorithm, Guarantee of Success, Pocket algorithm, Adaline, (3 hrs)
Multilayer networks, Multilevel discrimination, Architecture, objectives and working of Backpropagation algorithm. Setting the parameter values of Backpropagation algorithm. Accelerating learning process and applications of Backpropagation algorithm. (4 hrs)

MODULE II

Prediction tasks using Recurrent Networks and feedforward networks, Radial basis functions. Polynomial networks. (3 hrs)
Unsupervised learning. Hamming networks, simple competitive learning. counter-propagation network, adaptive resonance theory, Self organizing maps. (4 hrs)

Non-iterative procedures for association, Discrete Hopfield Network, Brain-State_in_a_box Network, Boltzmann Machine, Bi-directional Associate memory. (4 hrs)

MODULE III

History and Motivation for Fuzzy Logic. Classical sets, Fuzzy sets, Operations of Fuzzy sets, Properties of Fuzzy sets, A Geometric interpretation of Fuzzy sets, possibility theory. (03 hrs) Fuzzy relations, composition of Fuzzy relations, Fuzzy graphs and numbers, Functions with Fuzzy arguments, arithmetic operations on Fuzzy numbers. (2 hrs)
Basics of Fuzzy rules, Fuzzy mapping rules, Fuzzy implication rules, Fuzzy rule based models for function approximation, Theoretical foundation of fuzzy mapping rules, Types of fuzzy rule based models: Mamdani model, TSK model, and standard additive model.(5 hrs)

MODULE IV

Propositional logic and first order predicate calculus. Fuzzy logic: Fuzzy implication, approximate reasoning, Criteria of Fuzzy implications, Three families of Fuzzy implications. Possibility versus Probability, Probability of a Fuzzy event. Probabilistic interpretation of Fuzzy sets. (5hrs).
Fuzzy Logic in Expert Systems. intelligent agents and Mobile robot navigation,.
Fuzzy logic in database systems, Fuzzy relational data models and operations, Fuzzy object oriented database. Fuzzy information Retrieval and Web search. (5 hrs)

TEXT BOOK

1. Elements of Artificial Neural Networks by Kishan Mehrotra, Chilukuri Mohan, and Sanjay Ranka, Penram International Publishing (India)
2. Fuzzy Logic, Intelligence, Control and Information by John Yen and Reza Langari, Pearson Education

REFERENCE BOOK

1. Neural Networks and Fuzzy Systems: A dynamical Systems Approach toi Machine Intelligence, by Bart Kosko, PHI
2. Neural Networks: A comprehensive Foundation, - By Simon Haykin, Pearson Education
3. Introduction to Artificial Neural Networks, - By Jacek M. Zurada, Jaico PublishingHouse
4. Neural Networks, Fuzzy Logic, and Genetic Algorithms Synthesis and Applications by S. Rajasekaran, G.A. Vijayalakshmi Pai, PHI
5. Foundation to Fuzzy sets and Fuzzy Logic by M. Ganesh, PHI

IT8.4.a.VLSI VLSI DESIGN (Elective IV)

Lectures per Week : (3 + 1 + 2)
Max Marks for Theory Paper : 100
Max Marks for Sessionals : 20 + 5
Max marks for orals : 50
Duration of Paper : 3 hrs
Total No of Modules : 4
No. of Questions from each module : 2
Total no. of questions to be answered: 5(At least one question from each module with two compulsory questions from any one module)

Course Objective:
The subject is designed for graduate level to explore the methods of digital circuit design and Integrated circuit design procedures.

Instruction Objectives:
The first module is related to IC fabrication and materials required for IC fabrication second and third module are providing the conceptual knowledge of CMOS architecture, working and its usage in making digital circuits, fourth module explain the procedures of testing integrated circuit designs.

MODULE I

MOS transistor switches: CMOS logic- Inverter, NOR, NAND and combinational logic, compound gates, Multiplexers, Transmission gates, latches and Registers. (2 Hrs)
MOS Transistor: Structures, MOS system under external bias, operation of MOS transistor (MOSFET), threshold voltage, MOSFET I-V characteristics, Channel Length Modulation, substrate bias effect, measurements of parameters – K_N, V_{TP} & γ, MOSFET capacitance. (5 Hrs)
MOS Inverters:Static load MOS Inverters, CMOS Inverter Design, Operation, DC Characteristics, Noise margins, Power and Area considerations. (3 Hrs)

MODULE II

Modeling of MOS transistor circuits using SPICE (level1 model equations) (3 Hrs)
Switching Circuit Characteristics: Rise , fall and delay time, Gate delays, Transistor sizing, static and dynamic power dissipations. (3 Hrs)
CMOS logic gate design: Fan –in and fan out, NOR , NAND and Complex logic gates and their layouts (Euler paths). CMOS logic- Inverter, NOR, NAND and combinational logic, compound gates, Multiplexers, Transmission gates, latches and Registers. (4 Hrs)

MODULE III

Silicon semiconductor Technology: Wafer processing, Oxidation, Epitaxy, Deposition, Ion-implantation and Diffusion silicon gate process. (4 Hrs)
Basic CMOS technology: n-well and p-well CMOS process, Silicon on insulator. (2Hrs)

MOSIS layout design: rules (full-custom mask layout designs), stick diagrams, layout editors (Magic/Micro Wind) and circuit extraction. FPGA and CPLD. (4Hr)

MODULE 4

VLSI design methodologies: VLSI design flow, design analysis, simulations: circuit, timing, switch-level, gate-level (or logic). Using HDLs : VHDL. (5Hrs)
Design verification: Electrical, timing, functional. Design synthesis: Circuit and logic Synthesis. Testing: Test procedure, Design for Testability, Scan Based Test, Boundary- Scan Design, Built in self test . (3 Hrs)
Automatic Test-Pattern generation (ATPG). Fault models and its simulation. (2Hrs)

TEXTBOOKS:

1. Digital Integrated Circuits (Analysis and Design) by Yusuf and Kong.
2. Principles of CMOS VLSI Design by Neil H.E. Weste, Kamran Eshranghian.
3. Digital Integrated Circuits – (Design perspective) by Jan M. Rabaey.
4. Fundamentals of Digital logic with VLSI design by Stephen Brown, Zvonco Vranesic

REFERENCE BOOKS:

1. Basic VLSI Design by Douglas Pucknell, Kamran Eshraghian, PHI.
2. Modern VLSI design (Systems on Silicon) by Wayne Wolf.
3. Introduction to VLSI design by Eugene D. Gabricius.

IT8.4.b.ESD EMBEDDED SYSTEM DESIGN (Elective IV)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objectives:

The main objective of this course is to provide the student with the basic understanding of design process in embedded system. This includes system requirements specifications, architectural and detailed design, and implementation, focusing on real-time applications of embedded system.

Instructional Objectives:

At the end of this course student will be exposed to microcontroller-based embedded systems design and hardware architecture, It includes embedded systems and its hardware organization, microcontroller architecture, interfacing technique ,embedded programming in C ,Real Time operating System(RTOS) concepts.

MODULE I

Introduction to Embedded System: Processor in the system, Hardware units, Software embedded into a system, Exemplary embedded system. (2 Hrs)

8051 Microcontroller Architecture: Hardware, Input/output pins, Ports and circuits, Interfacing to external memory, Counters and timers, Serial data input and output, Interrupts. (3 Hrs)

8051 Instruction Set: Addressing Modes, Data movement instruction: External Data move. Code memory Read-Only-Data moves, Push and Pop opcodes , Data exchanges. Logic operation: Bit and Byte level, Rotate and Swap. (5 Hrs)

MODULE II

The 8051 Instruction Set: Arithmetic operations: Flags, Incrementing, decrementing, Addition, subtraction, Multiplication and division, Decimal arithmetic. (3 Hrs)

Jump and call Instructions: Jump and call program range, Jumps, Call and subroutine, Interrupts and returns in details. (3 Hrs)

Timer|Counter Programming: Programming 8051 timer, Counter programming, Programming timer 0 and 1 in 8051 C. (4 Hrs)

MODULE III

Serial Communication: Basics of Serial Communication , 8051 connections to RS-232, 8051 serial Communication Programming in C. (3 Hrs)

Interrupt Programming: 8051 Interrupts, Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupt, Interrupt Priority in the 8051, interrupt Programming in C. (4 Hrs)

8051 programming in C: Data type and time delay in 8051 C, I/O programming in 8051 C , Logic operation in 8051 C, Data conversion program in 8051 C , Accessing code ROM space in 8051 C, Data serialization using 8051 C. (3 Hrs)

MODULE IV

Interfacing 8051: LCD Interfacing, Keyboard interfacing, Digital to Analog Converter (DAC) interfacing, Sensor interfacing and signal conditioning. (2 Hrs)

Real Time Operating Systems (RTOS): Operating system services , I/O subsystems, Network Operating system, Real-Time & embedded system operating system, Interrupt routine in RTOS environment, RTOS task scheduling models, Performance metric in scheduling models, Action in preemptive scheduler, Strategy for synchronization, Embedded Linux internals, OS security issues, Mobile OS. (5 Hrs)

Embedded software development tools: Code generation tools, Simulator, Testing and debugger, Integrated Development Environments (IDE) for 8051 systems, Memory and Processor sensitive program and device drivers. (3 Hrs)

TEXT BOOKS:

1. The 8051 Microcontroller, Architecture, Programming & applications-Second edition by Kenneth J. Ayala, Penram International, ISBN: 81-90828-4-1.
2. The 8051 Microcontroller and Embedded Systems using assembly & C by Muhammad Ali Mazidi and Janice Mazidi, Prentice-Hall of India, ISBN: 013119402X

REFERENCE BOOKS:

1. Embedded System: architecture, programming and design By Raj Kamal ,Tata Mc-Graw-Hill publishing company limited, ISBN: 0-07-049470-3

IT8.4.c.SPE SYSTEM PERFORMANCE AND EVALUATION (Elective IV)

Lectures per week : (3 + 1 + 2)
Max marks for Theory paper : 100
Max marks for Sessionals : 20 + 5
Max marks for orals : 50
Duration of paper : 3 hours
Total no. of modules : 4
No. of questions from each module : 2
Total no. of questions to be answered: 5 (At least one question from each module with two compulsory questions from any one module.)

Course objectives:

In this course we aim to provide students with a deeper understanding of Computer System evaluation techniques. In particular we focus on various tuning parameters with respect to web, database and operating system

Instructional Objectives:

After completing this course students will be able to:

1. Understand in depth the concepts and techniques applied to the performance evaluation of computer systems.
2. Consider performance in design and development stages of computer systems such as hardware components, networks, operating systems and database systems

MODULE I

Evolution of computer systems architectures. Evolution of database systems, Evolution of operating system, Evolution of computer networks, Need for performance evaluation, Role of performance evaluation in computer engineering. (5 Hrs)

Overview of performance evaluation methods, Performance metrics and evaluation criteria. Fundamental Concepts and Performance Measures: Time, Events, Measurements, Intervals, Response, Independence, Randomness, workloads, Problems encountered in model development and use. (5 Hrs)

MODULE II

Capacity Planning: Bandwidth, speed of server and memory requirements. Performance monitoring: Parameters of performance, Latency and throughput, Utilization, Efficiency, Monitoring web performance. (5 Hrs)

Load testing: Load test preparation, Trade –offs with load testing Tools, Writing your own load testing tools, Benchmark Specification and Benchmark Tests. Performance Analysis:

Using analysis.cgi to find a bottleneck, snooping HTTP with Sprocket, Look at connections, Log file Analysis, Hits per second. (5 Hrs)

MODULE III

Database Systems Performance Analysis: The testbed system, The database systems, Testbed performance analysis testing, The results, Index tuning: Types of queries, Key Types, Datastructures, Sparse verses dense indexes, To cluster or not to cluster, Joins, foreign key constrains and indexes. (6 Hrs)

Tuning Relational systems: Table Schema and normalization, Clustering two tables, Aggregate Maintenance, Query Tuning, Triggers. (4 Hrs)

MODULE IV

Analysis of operating system components: System architecture, Workloads, Experimental design and, Simulation, Experimental analysis and conclusion. (4 Hrs)
Analysis of computer Network components: Analytical modeling examples, simulation modeling of local area networks. (3 Hrs)
Case Studies: Database Table growing without limit, Reverse DNS lookups slows logging, Kinked cable, Database connection pool growth limits Performance. (3 Hrs)

TEXT BOOKS:

1. Computer Systems performance Evaluation and Prediction by Paul J. Fortier & Howard E. Michel, Elevier India Pvt. Ltd., ISBN: 1-55558-260-5
2. Web Performance Tuning by Patrick Killelea, O'relly- Shroff Publications, ISBN: 81-7366-441-2
3. Database Tuning Principles, Experiments and Trouble Techniques by Dennis Shasha and Philippe Bonnet, Elsevier Publication, ISBN: 81-8147-324-8

REFERENCE BOOKS:

1. The Art of Computer Systems Performance Analysis by Raj Jain

IT8.4.d.ACA ADVANCED COMPUTER ARCHITECTURE (Elective IV)

Lectures per week	: (3 + 1 + 2)
Max marks for Theory paper	: 100
Max marks for Sessionals	: 20 + 5
Max marks for orals	: 50
Duration of paper	: 3 hours
Total no. of modules	: 4
No. of questions from each module	: 2
Total no. of questions to be answered	: 5 (At least one question from each module with two compulsory questions from any one module.)

Course Objective:

The aim of the course is to introduce Advance computer architecture and to give students an insight into the various types of processors. The course will help them to be able to learn the internal architecture of various types of processors.

Instructional Objective:

To familiarize the students, how modern computer systems work and are built. Methods are discussed which have been developed in order to improve the performance of current microprocessors and parallel systems.

MODULE I

Introduction to parallel processing: Evolution of computer systems, Parallelism in uniprocessors, Parallel computer modes, Architectural classification schemes, Parallel processing applications, Conditions of parallelism, Types of parallelism. (5 Hrs)

Introduction to pipelining: Linear pipeline processor, Non-linear pipeline processors, Instruction and Arithmetic pipeline design, principles of designing pipelined processors. (3 Hrs)

Memory and Input/Output Subsystems: Hierarchical memory technology, Addressing schemes, Locality of References, Hierarchy optimization. (2 Hrs)

MODULE II

Principles of Pipelining and Vector Processing: Vector processing principles, Vector loops and chaining, pipelined vector processing methods, Architecture or Cray-1,Vectorization and Optimization methods. (6 Hrs)

Structures and Algorithms for Array Processors: Introduction to SIMD Computer Organization, Interconnection networks, parallel algorithms for array processors, The Illiac-IV System architecture and applications. (4 Hrs)

MODULE III

Associative array processing: Associative memory organization. (2 Hrs)

Multiprocessors Architecture and Programming: Functional structures, Interconnection networks, Cache coherence and solutions, Interleaved memory organization, Multiprocessor operating systems, Language features to exploit parallelism, Process synchronization mechanisms, system deadlocks and protection, Cray X-MP system architecture and multitasking. (8 Hrs)

MODULE IV

Dataflow computers: Control flow versus data flow computers, Data flow architectures, Static and Dynamic data flow computers, Demand-driven mechanism, Data flow graphs and languages. Advantages and potential problems in data flow computers. (6 Hrs)

RISC processor and CISC processor: Parallel Model, Parallel languages and compiler, Loop parallization and pipelining. Parallel programming environment: Software development tools. (4 Hr)

TEXT BOOKS:

1. Computer architecture and parallel processing by Hwang and Briggs, TMH, ISBN:0-07-031556-6.

REFERENCE BOOKS

1. Computer Architecture by Nicholas Carter, TMH, ISBN: 0-07-048332-5
2. Advanced computer architecture by Kai Hwang, TMH, ISBN: 0-07-031622-8