

Course Structure and Syllabus for Under Graduate Programme
Department of Information Technology, JIS College of Engineering
(An Autonomous Institution)

Bachelor of Technology in Information Technology

1st Year - Semester 1

Paper code	Name of the subjects	Periods (WCH)			Credits	Total Credits	Marks		
		L	T	P			IE	FE	Total Marks
HU101	Professional Communication	2	0	0	2	20	30	70	100
M101	Mathematics-I	3	1	0	4	40	30	70	100
PH101	Physics –I	3	1	0	4	40	30	70	100
EE101	Basic Electrical Engineering	3	1	0	4	40	30	70	100
ME101	Engineering Mechanics	3	1	0	4	40	30	70	100
HU191	Language Lab	0	0	2	2	20	40	60	100
PH191	Physics Lab-I	0	0	3	2	20	40	60	100
EE191	Basic Electrical Engineering Lab	0	0	3	2	20	40	60	100
ME191	Engineering Workshop Practice	0	0	3	2	20	40	60	100
IT191	Computer Practice Lab	0	0	3	2	20	40	60	100
XC181	NCC/NSS	0	0	2	1	10	40	60	100
	Total	14	4	16	29	290	390	710	1100

B. Tech in Information Technology
1st Year - Semester 1

Paper Name: Professional Communication

Paper Code:HU101

Contacts:2L

Credit:2

Fundamentals of Technical Communication : process of communication, language as a tool of communication, levels of communication , flow of communication, barriers to communication, communication across cultures; Technical Communication: meaning, significance, characteristics, difference between technical and general communication.[4L]

Elements of Written Communication: words and phrases, word formation, synonyms and antonyms, homophones, one word substitution, sentence construction, paragraph construction,tense,preposition,voice change .[8L]

Forms of Technical Communication: business letters, job application letter and resume, business letters: sales & credit letters, letters of enquiry, letters of quotation, order, claim and adjustment letters, official letters: D.O. letters, government letters, letters to authorities, etc.

Technical Reports: general format of a report, formal and informal reports, memo report, progress report, status report, survey report, trip report, trouble report, laboratory report, research papers, dissertations and theses.

Technical Proposals: purpose, characteristics, types, structure. [8L]

Presentation Strategies: defining the subject, scope and purpose, analysing audience & locale, collecting materials, preparing outlines, organising the contents, visual aids, nuances of delivery, extemporaneous, manuscripts, impromptu, memorization and non- verbal strategies.[6L]

Value-based Text Reading: [4L]

(A) Study of the following essays from the text book with emphasis on writing skills:

1. The Thief by Ruskin Bond
2. The Open Window by Saki
3. Marriage is a private Affair by Chinua Achebe
4. The Moon in the Earthen Pot by Gopini Karunakar

Suggested Text / Reference Books:

1. Board of Editors: Contemporary Communicative English for Technical Communication, Pearson Longman,2010
2. Dr. D. Sudharani: Manual for English Language Laboratory Pearson Education (W.B. edition), 2010
3. Technical Communication Principles and Practice by Meenakshi Raman, Sangeeta Sharma(Oxford Higher Education)
4. Effective Technical Communication by Barun K.Mitra(Oxford Higher Education)
5. V. Sashikumar (ed.): Fantasy- A Collection of Short Stories Orient Black swan (Reprint 2006)

Paper Name: Mathematics-I

Paper Code: M101

Contacts:3L+1T

Credit:4

Matrix: Determinant of a square matrix, Minors and Cofactors, Laplace's method of expansion of a determinant, Product of two determinants, Adjoint of a determinant, Jacobi's theorem on adjoint determinant. Singular and non-singular matrices, Adjoint of a matrix, Inverse of a non-singular matrix and its properties, orthogonal matrix and its properties, Trace of a matrix. Rank of a matrix and its determination using elementary row and column operations.

Infinite Series: Preliminary idea of sequence, Infinite series and their convergences/divergences, Infinite series of positive terms, Tests for convergence: Comparison test, Cauchy's root test, D'Alembert's ratio test and Raabe's test. Alternating series, Leibnitz's test. Absolute convergence and Conditional convergence. Power series (Definition and Examples).

Calculus of functions of single variable: Successive differentiation : Higher order derivatives of a function single variable, Leibnitz's theorem (statements and its applications). Rolle's theorem and its applications. Mean value theorem- Lagrange & Cauchy and their application, Taylor's theorem with Lagrange's and Cauchy's form of remainders and its application, Taylor's and Maclaurin's theorem (Statements only), Maclaurin's infinite series expansion of functions: $\sin x$, $\cos x$, e^x , $\log(1+x)$, $(a+x)^n$, n being an positive integer or a fraction (assuming that the remainder $R_n \rightarrow 0$ as $n \rightarrow \infty$ in each case). Reduction formulae both for indefinite and definite integrals of types

$$\int \sin^n x, \int \cos^n x, \int \sin^m x \cos^n x, \int \cos^m x \sin^n x, \int \frac{dx}{(x^2 + a^2)^n}, m, n$$

are positive integers.

Calculus of functions of several variables: Introduction to functions of several variables with examples, Knowledge of limit and continuity, Partial derivatives and related problems, Homogeneous functions and Euler's theorem and related problems up to three variables, Chain rules, Differentiation of implicit functions, Total differentials and their related problems, Jacobians up to three variables and related problems, Maxima, minima and saddle points of functions and related problems, Concept of line integrals, Double and triple integrals.

Vector Calculus: Scalar and vector fields . Vector function of a scalar variable, Differentiation of a vector function, Gradient of a scalar point function, Directional derivative. Divergence and curl of a vector point function and related problems . Green's Theorem, Gauss Divergence Theorem and Stoke's Theorem (Statements and Applications).

Suggested Text / Reference Books:

1. Advanced Engineering Mathematics 8e by Erwin Kreyszig is published by Wiley India.
2. Engineering mathematics: B.S.Grewal (S.Chand & Co.).

- 3.higher Engineering Mathematics: John Bird (4th Edition, 1st India Reprint 2006,Elsevier.
- 4.mathematics Handbook : for Science and Engineering,L.Rade and B.Westergen(5PthP edition,1PstP Indian Edition 2009,Springer)
- 5.Calculus :M.J.Strauss,G.L.Bradly and K.L.Smith (3PrdP,1PstP Indian Edition 2007,Pearson Education)
- 6.Engineering mathematics: S.S.Sastry (PHI,4PthP Edition,2008)
- 7.Advanced Engineering Mathematics,3E:J.L.Goldberg and E.F.Abonfadel (OUP),Indian Edition.

Paper Name: Physics-I

Paper Code:PH101

Contacts:3L+1T

Credit:4

Module 1: Classical Mechanics

1.01: Classical Mechanics: Limitations of Newtonian Mechanics, constraint, degree of freedom, generalized coordinates, Lagrange's equation (No derivation), Hamilton's principle, Applications of Lagrange's equation: Linear Harmonic Oscillators-Differential equation and its solution, superposition of two linear SHM's (with same frequency), Lissajous' figures. 4L

1.02: Damped vibration: Introduction – differential equation and its solution, critical damping, Logarithmic decrement. 1L

1.03: Forced vibration: Introduction – differential equation, Amplitude and velocity resonance, Sharpness of resonance and Quality factor, Application to L-C-R Circuit 2L

1.04: Electromagnetic theory-I:

1.04-A: Vector operators, Gradient, Divergence, Curl-Physical significance, Gauss's divergence theorem (statement only), Stoke's theorem (statement only) and their applications. 2L

1.04-B: Development of electromagnetic theory, Electromagnetic spectrum, Concept of displacement current, equation of continuity, Maxwell's field equations with physical significance, wave equation in free space, transverse nature of electromagnetic wave, electromagnetic waves in a charge free conducting medium, skin depth, Poynting vector. 3L

Module 2: OPTICS 1:

2.01: Interference – Conditions for sustained interference, Young's double slit as an example . Qualitative idea of Spatial and Temporal Coherence, Conservation of energy and intensity distribution, Fresnel's Biprism, thin films of uniform thickness (derivation) Newton's ring. 4L

2.02: Diffraction of light – Fresnel and Fraunhofer class. Fraunhofer diffraction for single slit and double slits (elementary treatment, Intensity distribution). Plane transmission grating (No deduction of the intensity distributions is necessary). Missing orders. Dispersive power, Rayleigh criterion (qualitative), Resolving

power of grating (Definition and formulae). Use of grating as a monochromator. 3L

2.03: Polarization: General concept of Polarization, Plane of vibration and plane of polarization, Concept of Plane, Circularly and Elliptically polarized light (using wave equations), Polarization through reflection and Brewster's law, Double refraction (birefringence) -Ordinary and Extra-ordinary rays, Nicol's Prism. 3L

2.04: Laser : Spontaneous and Stimulated emission of radiation, Population inversion, Einstein's A & B co-efficient (derivation of the mutual relation), concept of laser as a polarized source, Optical resonator and Condition necessary for active Laser action, Ruby Laser, He-Ne Laser, semiconductor Laser- applications of laser. 3L

2.05: Fiber optics: Optical Fibers – Core and cladding, total internal reflection step index and graded index fiber, Calculation of Numerical aperture and acceptance angle, losses in the fiber, applications. 2L

Module 3: Elementary solid state physics

3.00: Crystallography & Solid state physics: Space lattice, unit cell, crystal systems, Bravais lattices, basis, co-ordination number and atomic packing fraction, scc, bcc and fcc and hcp structures lattice planes, indexing of directions, Miller indices, interplaner spacing, Bragg's law & its application to real crystal structure (NaCl, KCl). 4L

Module 4: Quantum Mechanics I:

4.01: Matter waves: Concept of de Broglie's Matter waves, derivation of wavelength of matter waves in different forms, Concept of Phase velocity and Group velocity (qualitative) 2L

4.02: Wave mechanics: Concept and Physical significance of wave function Ψ and interpretation of $|\Psi|^2$, Ψ (normalization and probability interpretation), Heisenberg's Uncertainty principle with illustration; Schrödinger's equation- time dependent and time independent form (derivation). Discussion with relevant problems. 3L

4.03: Operator algebra: Operator, Commutator, Formulation of quantum mechanics and Basic postulates, Operator correspondence, Expectation values, Ehrenfest theorem. Discussion with relevant problems. 4L

List of Assignments/Tests:

- **15 marks Internal test 1 & Internal test 2 (best of the two would be considered)**
- **Assignments in regular classes, tutorial classes and surprise tests.**

General idea about Measurements and Errors (Mandatory):

Measurand (objects to be measured) precision, significant number., accuracy, certainty, resolution; Errors - types and sources of errors (definitions and examples), Systematic error, Random error, Ambiguity error, Dynamic error, with example of Slide calipers, Screw-gauge, Carrey Foster bridge. Study of different types of unit cells with model system.

Experiments on Classical Mechanics:

1. Study of torsional oscillation of torsional pendulum & determination of time period using various load of the oscillator.
2. Experiments on Lissajous figure (using CRO).
3. Study of LCR circuit using ac signal and determination of Q factor.

Experiments on Optics:

4. Determination of wavelength of light by Newton's ring method.
5. Determination of wavelength of light by Fresnel's bi-prism method.
6. Determination of wavelength of light by Laser diffraction method.
7. Determination of numerical aperture and the energy losses related to optical fibre experiment
8. Study of Hydrogen/ Helium spectrum using transmission grating and measurement of Rydberg Constant.
9. Inspection of Laser beam profile-to find beam divergence.
10. Study of half-wave and quarter wave plates.
11. Measurement of specific rotation of an optically active solution by polarimeter

Experiments on electromagnetic theory:

12. Measurement of nodal and antinodal points along a transmission wire and measurement of wave length.

Experiments on Quantum Mechanics I

13. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
14. Measurement of Stopping potential using a photocell and determination of Planck's Constant.

Suggested Text / Reference Books:

Module 1: Experiments on Classical Mechanics:

1. Classical Mechanics- J. C. Upadhyay (Himalya Publishers)
2. Classical Mechanics-Shrivastav
3. Classical Mechanics-Takwal & Puranik (TMH)
4. Sound-N. K. Bajaj (TMH)
5. Advanced Acoustics-D. P. Roy Chowdhury (Chayan Publisher)
6. Principles of Acoustics-B.Ghosh (Sridhar Publisher)
7. A text book of sound-M. Ghosh (S. Chand publishers)
8. Electromagnetics-B.B. Laud (TMH)
9. Electricity Magnetism-B.Ghosh (Book & Allied Publisher)
10. Electricity Magnetism-Chattoadhyay & Rakshit (New Central Book Agency)
11. A text book of Light- K.G. Mazumder & B.Ghoshs, (Book & Allied Publisher)
12. Electricity Magnetism-Fewkes and Yardwood (Oxford University Press)

Module 2: OPTICS 1:

1. A text book of Light- K.G. Mazumder & B.Ghoshs (Book & Allied Publisher)
2. A text book of Light-Brijlal & Subhramanium, (S. Chand publishers)
3. Modern Optics-A. B. Gupta (Book & Allied Publisher)
4. Optics-Ajay Ghatak (TMH)
5. Optics-Hecht
6. Optics-R. Kar, Books Applied Publishers

Module 3: Elementary solid state physics

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1. Solid state physics-Puri & Babbar (S. Chand publishers)
2. Materials Science & Engineering-Kakani Kakani
3. Solid state physics- S. O. Pillai
4. Introduction to solid state physics-Kittel (TMH)
5. Solid State Physics and Electronics-A. B. Gupta, Nurul Islam (Book & Allied Publisher)

Module 4: Quantum Mechanics I:

1. Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)
2. Quantum Mechanics-Bagde Singh (S. Chand Publishers)
3. Perspective of Quantum Mechanics-S. P. Kuilla (New Central Book Agency)
4. Quantum Mechanics-Binayak Datta Roy (S. Chand Publishers)
5. Quantum Mechanics-Bransden (Pearson Education Ltd.)
6. Perspective of Modern Physics-A. Beiser (TMH)

General Reference:

1. Refresher courses in physics (Vol. 1, Vol. 2 & Vol. 3)-C. L. Arora (S. Chand Publishers)
2. Basic Engineering Physics-Amal Chakraborty (Chaya Prakashani Pvt. Ltd.)
3. Basic Engineering Physics-I -Sujoy Bhattacharya, Saumen Paul (TMH)
4. University Physics-Sears & Zemansky (Addison-Wesley)

**PHYSICS-I SYLLABUS (PROPOSED) AS PER
MODULES & EXAM-GROUP* DIVISION**

STREAM	MODULE -1	MODULE-2	MODULE -3	MODULE -4	GR-A *	GR-B*
1st year Basic Physics course	OPTICS 1: 4+3+3+3+2 =15L	Waves and Vibration, Electromagnetic theory-I: 2+2+3+5=12L	Elementary solid state physics 4L	Quantum Mechanics I: 9L	1.01: Classical Mechanics (4L) 1.02: Damped vibration (1L) 1.03: Forced vibration (2L) 2.02: Diffraction of light (3L) 2.05: Fiber optics (2L) 3.00 Elementary solid state physics. (4L) 4.03: Operator algebra (4L)	1.04 A & B: Electromagnetic theory-I (5L) 2.01: Interference (4L) 2.03: Polarization (3L) 2.04: Laser (3L) 4.01: Matter waves: (2L) 4.02: Wave mechanics (3L)

Paper Name: Basic Electrical Engineering
Paper Code: EE101

Contacts: 3L + 1T = 4

Credits: 4

DC Network Theorem:[7L] Definition of electric circuit, network, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, Kirchhoff's law, Principle of superposition. Source equivalence and conversion, Thevenin's theorem, Norton Theorem, nodal analysis, mesh analysis, star-delta conversion. Maximum power transfer theorem with proof.

Electromagnetism:[5L] Biot-savart law, Ampere's circuital law, field calculation using Biot-savart & ampere's circuital law. Magnetic circuits, Analogous quantities in magnetic and electric circuits, Faraday's law, Self and mutual inductance. Energy stored in a magnetic field, B-H curve, Hysteretic and Eddy current losses, Lifting power of Electromagnet.

AC fundamental:[] Production of alternating voltage, waveforms, average and RMS values, peak factor, form factor, phase and phase difference, phasor representation of alternating quantities, phasor diagram, behaviour of AC series, parallel and series parallel circuits, Power factor, Power in AC circuit, Effect of frequency variation in RLC series and parallel circuits, Resonance in RLC series and parallel circuit, Q factor, band width of resonant circuit.

Electrostatics:[5L] Coulomb's law, Electric Field Intensity, Electric field due to a group of charges, continuous charge distribution, Electric flux, Flux density, Electric potential, potential difference, Gauss's law, proof of Gauss's law, its applications to electric field and potential calculation, Capacitor, capacitance of parallel plate capacitor, spherical capacitor, isolated spheres, concentric conductors, parallel conductors. Energy stored in a capacitor.

DC Machines:[6L] Construction, Basic concepts of winding (Lap and wave). DC generator: Principle of operation, EMF equation, characteristics (open circuit, load) DC motors: Principle of operation, Speed-torque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armature-voltage and field control)

Single phase transformer:[4L] Core and shell type construction, EMF equation, no load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation.

3 phase induction motor:[5L] Types, Construction, production of rotating field, principle of operation, equivalent circuit and phasor diagram, rating, torque-speed characteristics (qualitative only). Starter for squirrel cage and wound rotor induction motor. Brief introduction of speed control of 3 phase induction motor (voltage control, frequency control, resistance control)

Three phase system: [3L] Voltages of three balanced phase system, delta and star connection, relationship

between line and phase quantities, phasor diagrams. Power measurement by two watt meters method.

General structure of electrical power system:[1L] Power generation to distribution through overhead lines and under-ground cables with single lone diagram.

Suggested Text / Reference Books:

Text books:

1. Basic Electrical engineering, D.P Kothari & I.J Nagrath, TMH, Second Edition
2. Fundamental of electrical Engineering, Rajendra Prasad, PHI, Edition 2005.
3. Basic Electrical Engineering, V.N Mittle & Arvind Mittal, TMH, Second Edition
4. Basic Electrical Engineering, J.P. Tewari, New age international publication

Reference books:

1. Basic Electrical Engineering (TMH WBUT Series), Abhijit Chakrabarti & Sudipta Nath, TMH
2. Electrical Engineering Fundamental, Vincent.D.Toro, Pearson Education, Second Edition.
2. Hughes Electrical & Electronics Technology, 8/e, Hughes, Pearson Education.
3. Basic Electrical Engineering, T.K. Nagsarkar & M.S. Sukhija, Oxford
4. Introduction to Electrical Engineering, M.S. Naidu & S, Kamakshaiah, TMH
5. Basic Electrical Engineering, J.J. Cathey & S.A Nasar, TMH, Second Edition.

Paper Name: Engineering Mechanics

Paper Code:ME101

Contacts:3L+1T

Credit:4

Module 1:

Importance of Mechanics in engineering; Introduction to Statics; Concept of Particle and Rigid Body; Types of forces: collinear, concurrent, parallel, concentrated, distributed; Vector and scalar quantities; Force is a vector; Transmissibility of a force (sliding vector).

Introduction to Vector Algebra; Parallelogram law; Addition and subtraction of vectors; Lami's theorem; Free vector; Bound vector; Representation of forces in terms of i,j,k; Cross product and Dot product and their applications.

Two dimensional force system; Resolution of forces; Moment; Varignon's theorem; Couple; Resolution of a coplanar force by its equivalent force-couple system; Resultant of forces.

Module 2:

Concept and Equilibrium of forces in two dimensions; Free body concept and diagram; Equations of equilibrium.

Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction.

Module 3:

Distributed Force: Centroid and Centre of Gravity; Centroids of a triangle, circular sector, quadrilateral, composite areas consisting of above figures.

Moments of inertia: MI of plane figure with respect to an axis in its plane, MI of plane figure with respect to an axis perpendicular to the plane of the figure; Parallel axis theorem; Mass moment of inertia of symmetrical bodies, e.g. cylinder, sphere, cone.

Concept of simple stresses and strains: Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Factor of safety.

Module 4:

Introduction to Dynamics: Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to gravity;

Rectilinear motion of particles; determination of position, velocity and acceleration under uniform and non-uniformly accelerated rectilinear motion; construction of x-t, v-t and a-t graphs.

Plane curvilinear motion of particles: Rectangular components (Projectile motion); Normal and tangential components (circular motion).

Module 5:

Kinetics of particles: Newton's second law; Equation of motion; D'Alembert's principle and free body diagram; Principle of work and energy; Principle of conservation of energy; Power and efficiency.

Books Recommended

1. Engineering Mechanics [Vol-I & II] by Meriam & Kraige, 5th ed. – Wiley India
2. Engineering Mechanics: Statics & Dynamics by I.H. Shames, 4th ed. – PHI
3. Engineering Mechanics by Timoshenko, Young and Rao, Revised 4th ed. – TMH
4. Elements of Strength of Materials by Timoshenko & Young, 5th ed. – E.W.P
5. Fundamentals of Engineering Mechanics by Debabrata Nag & Abhijit Chanda – Chhaya Prakashani
6. Engineering Mechanics by Basudeb Bhattacharyya – Oxford University Press.
7. Engineering Mechanics: Statics & Dynamics by Hibbeler & Gupta, 11th ed. – Pearson

Paper Name: Language Laboratory

Paper Code: HU191

Credit:2

Contacts:2

- a) Honing 'Listening Skill' and its sub skills through Language Lab Audio device; 3P
- b) Honing 'Speaking Skill' and its sub skills; 2P
- c) Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/Voice modulation/Stress/ Intonation/ Pitch & Accent) of connected speech; 2P
- j) Honing 'Conversation Skill' using Language Lab Audio – Visual input; Conversational Practice Sessions (Face to Face / via Telephone, Mobile phone & Role Play Mode); 2P
- k) Introducing 'Group Discussion' through audio – Visual input and acquainting them with key strategies for success; 2P
- f) G D Practice Sessions for helping them internalize basic Principles (turn-taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD; 4P

- g) Honing 'Reading Skills' and its sub skills using Visual / Graphics/Diagrams /Chart Display/Technical/Non Technical Passages; Learning Global / Contextual / Inferential Comprehension; 2P
h) Honing 'Writing Skill' and its sub skills by using Language Lab Audio –Visual input; Practice Sessions 2P

Total Practical Classes 17

Books Recommended:

Dr. D. Sudharani: Manual for English Language Laboratory Pearson Education (WB edition),2010

Board of Editors: Contemporary Communicative English for Technical Communication,Pearson Longman, 2010

Paper Name: Computer Practice Lab

Paper Code:IT191

Contact: 3P

Credits: 2

1. History of Computer, Generation of Computer, Classification of Computers
2. Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices
3. Different number systems and their conversions (Decimal, Binary, Octal, and Hexadecimal), binary Arithmetics
4. Logic gates : AND gate, OR gate, NOT.
5. Assembly language, High level language, Compiler, Assembler, Interpreter, Linker, Loader (basic concepts)
6. Networking Concepts, LAN, MAN, WAN, WWW, Internet and Email.
7. MS-OFFICE(MS-WORD,MS-EXCEL,MS-POWERPOINT)
8. Design of Programming Logic:Algorithm and Flowchart, Construction of flowchart and algorithms
9. Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX, Basic organization of UNIX,Kernel
10. Basic DOS and UNIX commands

Paper Name: Engineering Workshop Practice(Gr-B / GrA)

Paper Code: ME191

Contact: 1L+3P= 4

Credits: 2

A. THEORETICAL PART

1. INTRODUCTION TO MANUFACTURING; Socio-economic role, Definition, Major grouping and Examples. - 1L
2. ENGINEERING MATERIALS; Classification / Major grouping, Physical, Chemical and Mechanical properties, Applications - 1L
3. DIFFERENT CONVENTIONAL MANUFACTURING PROCESSES MAINLY COVERING BASIC PRINCIPLES, DIFFERENT METHODS AND GENERAL APPLICATIONS; Manufacturing by forming /shaping from solid (input) to solid (product); Forging, Rolling, Drawing, Extrusion; Press tool work- Bending, Shearing, Drawing and Coining. - 3L
4. FORMING / SHAPING FROM LIQUID TO SOLID- CASTING; General principles, General

classification or Types of casting; Sand mould casting- procedural steps and requirements; Pattern, Mould, Melting, Pouring, Solidification, Extracting and Fettling. Other casting processes (for larger volume and quality); Centrifugal casting, Investment casting, Die casting. -3L

5. JOINING PROCESSES; Welding (Permanent Joining)- General classification and basis; Gas welding, Arc welding, Friction welding and Resistance welding, w.r.t. Principle, Requirements, Relative Advantages and Applications; Brazing and soldering.

- 2L

6. REMOVAL (MACHINING) PROCESS; Principle and purpose of machining, Machining requirements, Machine tools- Definition, General classification w.r.t, functional principles and applications; Major machining parameters (and responses)- Speed, Feed and Depth of cut; Tool geometry (Rake, Clearance and Cutting angles), Cutting fluid application; Elementary machining operations- Facing, Centering, Turning, Threading, Drilling, Boring, Shaping and Milling.

-2L

B. SCHEDULE OF PRACTICAL CLASSES

Suggested apportionment / weightage:

- Machining (and fitting)- 50% (6 days) 18 hrs
- Casting (including pattern making molding and preparation) - 25% (3 days 9hrs)
- Welding (gas, arc and resistance) (2 days 6hrs) and Sheet Metal Working (1 day 3hr)- 25% (3 days 9hrs)

FEASIBLE TYPES / MODELS OF ASSIGNMENTS

i) FITTING (in 2 days or 6 hours); Making a gauge from MS plate as shown in Fig.1.

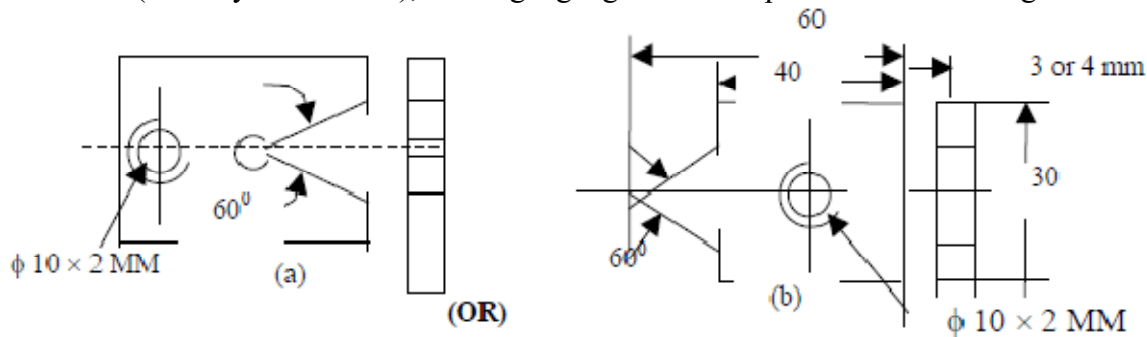


Fig.1: Job for fitting practice

Operations required:

11. Squaring and finishing of the blank by filing
12. Making the Vee-portion by sawing and filing
13. Drilling (in machine) and tapping (hand)

ii) MACHINING (in 3 days or 9 hours); To make a pin as shown in Fig.2 from a 20mm mild steel rod in a lathe.

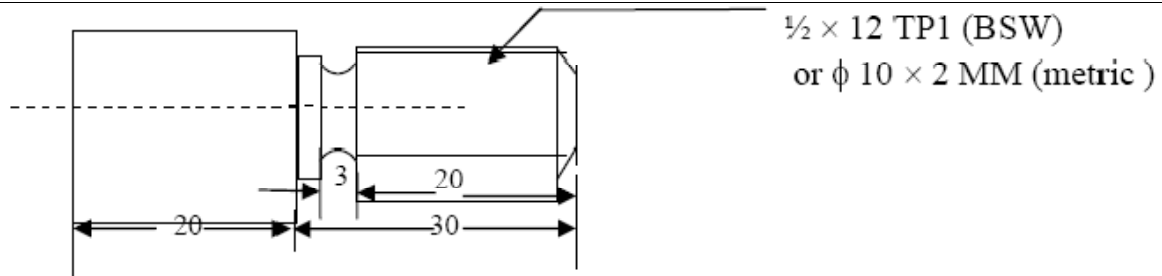
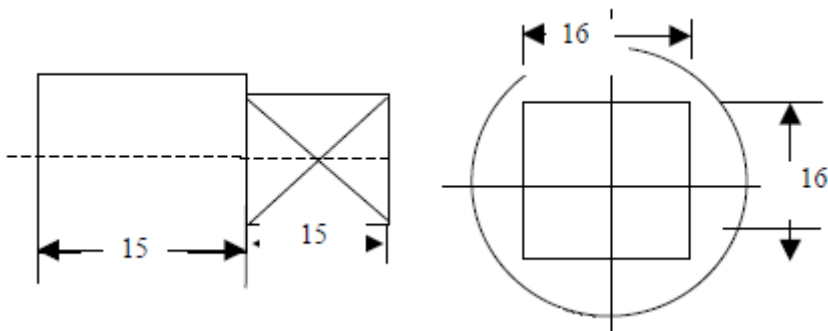


Fig.2: Job for practice on a lathe

iii) MACHINING (in 1 day or 3 hours); To make a MS prism as shown in Fig.3 from a 20mm mild steel rod in a shaping and / or milling machine.



iv) PATTERN MAKING, SAND MOULDING AND CASTING (in 3 classes or 9 hours); To make a wooden pattern and a sand mould with that pattern for casting a cast iron block as shown in Fig.4.

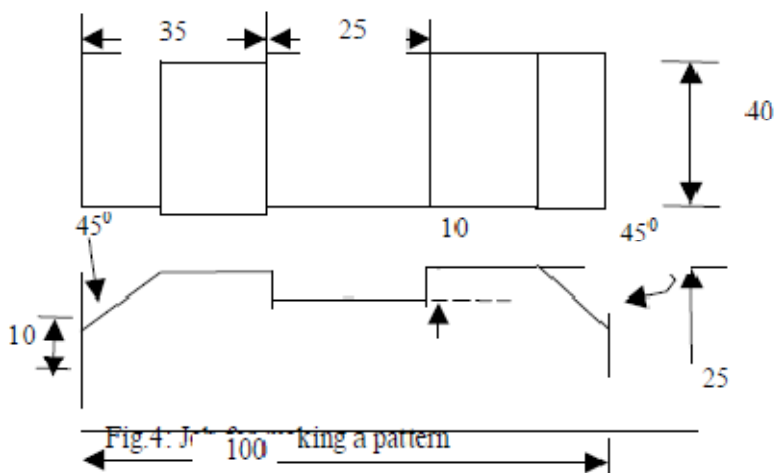


Fig.4: Making a pattern

v) WELDING (GAS WELDING) (in 1 class or 3 hours); To join two thin mild steel plates or sheets (1 to 3 mm thick) as shown in Fig. 5 by gas welding.

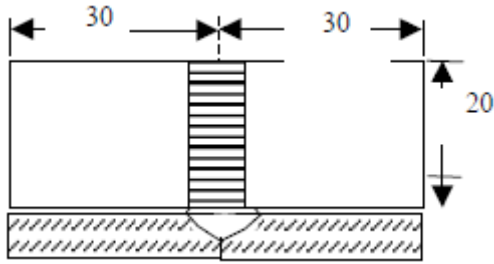


Fig.5: Welding specimen for practice

vi) WELDING (ARC WELDING) (in 1 day or 3 hours); To join two thick (6mm) MS plate as shown in Fig. 5 by arc welding.

vii) SHEET METAL WORK (in 1 day or 3 hours); Forming a cone, for example.

Paper Name: Physics Lab-I

Paper Code: PH191

Contacts:3P

Credit:2

General idea about Measurements and Errors (Mandatory):

Measurand (objects to be measured), precision, accuracy, certainty, resolution; Errors - types and sources of errors (definitions and examples), Systematic error, Random error, Ambiguity error, Dynamic error, with example of Slide calipers, Screw-gauge, Carrey Foster bridge. Study of different types of unit cells with model system.

Any 7 to be performed from the following experiments

Experiments on Classical Mechanics:

1. Study of torsional oscillation of torsional pendulum & determination of time period using various load of the oscillator.
2. Experiments on Lissajous figure (using CRO).
3. Experiments on LCR circuit.

Experiments on Optics:

4. Determination of wavelength of light by Newton's ring method.
5. Determination of wavelength of light by Fresnel's bi-prism method.
6. Determination of wavelength of light by Laser diffraction method.
7. Determination of numerical aperture and the energy losses related to optical fibre experiment

8. Study of Hydrogen/ Helium spectrum using transmission grating and measurement of Rydberg Constant.
9. Inspection of Laser beam profile-to find beam divergence.
10. Study of half-wave and quarter wave plates.

Experiments on electromagnetic theory:

11. Measurement of nodal and antinodal points along a transmission wire and measurement of wave length.

Experiments on Quantum Mechanics I

12. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
13. Measurement of Stopping potential using a photocell and determination of Planck's Constant.

Paper Name: Basic Electrical Engineering Lab

Paper Code:EE191

Contacts:3P

Credit:2

List of Experiments:

Sl. No Name of the Experiments

1. Characteristics of Fluorescent lamps
2. Characteristics of Tungsten and Carbon filament lamps
3. (a) Verification of Thevenin's theorem.
(b) Verification of Norton's theorems.
4. Verification of Maximum power theorem.
5. Verification of Superposition theorem
6. Study of R-L-C Series circuit
7. Study of R-L-C parallel circuit
8. Calibration of ammeter and voltmeter.
9. Open circuit and Short circuit test of a single phase Transformer.
10. No load characteristics of D.C shunt Generators
11. Starting and reversing of speed of a D.C. shunt
12. Speed control of DC shunt motor.
13. Measurement of power in a three phase circuit by two wattmeter method.

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(An Autonomous Institution)

Bachelor of Technology in Information Technology

1st Year - Semester 2

Paper code	Name of the subjects	Periods			Credits	Total Credits	Marks		
		L	T	P			IE	FE	Total Marks
HU201	Values & Ethics on Profession	2	0	0	2	20	30	70	100
M201	Mathematics-II	3	1	0	4	40	30	70	100
CH201	Engineering Chemistry	3	1	0	4	40	30	70	100
EC201	Basic Electronics Engineering	3	1	0	4	40	30	70	100
IT201	Principle of Procedural Programming	3	1	0	3	30	30	70	100
CH291	Engineering Chemistry Lab	0	0	3	2	20	40	60	100
EC291	Basic Electronics Engineering Lab	0	0	3	2	20	40	60	100
IT291	Programming Lab	0	0	3	2	20	40	60	100
ME291	Engineering Graphics Lab	0	0	3	2	20	40	60	100
	Total	14	4	12	25	250	310	590	900

Paper Name: Values & Ethics on Profession

Paper Code: HU201

Contact: 2L

Credits: 2

Group-A

Science, Technology and Engineering as knowledge and as Social and Professional Activities

Effects of Technological Growth:

Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: sustainable development

Energy Crisis: Renewable Energy Resources

Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations, Environmental Ethics
Appropriate Technology Movement of Schumacher; later developments Technology and developing notions. Problems of Technology transfer, Technology assessment impact analysis.

Human Operator in Engineering projects and industries. Problems of man, machine, interaction, Impact of assembly line and automation. Human centered Technology.

Group-B

Ethics of Profession:

Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond, Case studies.

Profession and Human Values:

Values Crisis in contemporary society

Nature of values: Value Spectrum of a good life

Psychological values: Integrated personality; mental health

Societal values: The modern search for a good society, justice, democracy, secularism, rule of law, values in Indian Constitution.

Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity

Moral and ethical values: Nature of moral judgements; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

Suggested Text / Reference Books:

1. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley & Sons, New York 1994 (2nd Ed)
2. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 1991.
3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996.

Paper Name: Mathematics-II

Paper Code: M201

Contact: 3L+1T

Credits: 4

Module I

Ordinary differential equations (ODE)- First order and first degree Exact equations, Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation. General solution of ODE of first order and higher degree (different forms with special reference to Clairaut's equation).

Module II

ODE- Higher order and first degree :General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods for finding P.I., Method of variation of parameters, Cauchy-Eulerequations, Solution of simultaneous linear differential equations.

Module III

Basics of Graph Theory: Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph,; Walks, Paths, Circuits, Euler Graph, Cut sets and cut vertices, Matrix representation of a graph, Adjacency and incidence matrices of a graph, Graph isomorphism, Bipartite graph

Module IV

Tree: Definition and properties, Binary tree, Spanning tree of a graph, Minimal spanning tree, properties of trees, Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using Kruskal's and Prim's algorithm.

Module V

Improper Integral: Basic ideas of improper integrals, working knowledge of Beta and Gamma functions (convergence to be assumed) and their interrelations. Problems related to Beta and Gamma functions.

Laplace Transform (LT): Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property; LT of $(\int t^n)$, LT of $(\int t^n e^{at})$, LT of derivatives of $(\int t^n)$, L.T. of $(\int u du)$. Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT: Definition and its properties; Convolution Theorem (statement only) and its application to the evaluation of inverse LT, Solution of linear ODE with constant coefficients (initial value problem) using LT. Z transform.

Suggested Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, (Wiley Eastern)
2. Graph Theory: V. K. Balakrishnan, (Schaum's Outline, TMH)
3. A first course at Graph Theory: J. Clark and D. A. Holton (Allied Publishers LTD)
4. Introduction to Graph Theory: D. B. West (Prentice-Hall of India)
5. Graph Theory: N. Deo (Prentice-Hall of India)
6. Engineering Mathematics: B.S. Grewal (S. Chand & Co.)

7. Higher Engineering Mathematics: John Bird (4th Edition, 1st Indian Reprint 2006, Elsevier)
8. Calculus: Strauss, Bradley and Smith (3rd Edition, Pearson Education)
9. Engineering Mathematics (Volume 2): S. S. Sastry (Prentice-Hall of India)
10. Advanced Engineering Mathematics, 3E: M.C. Potter, J.L. Goldberg and E.F. Abonfadel (OUP), Indian Edition
11. An Introduction to Differential Equations, R.K. Ghosh and K.C. Maity (New Central Book Agency)

Paper Name: Engineering Chemistry

Paper Code: CH201 (IT&CSE)

Contacts: 3L + 1T = 4

Credits: 4

Module 1

Chemical Thermodynamics:

Concept of Thermodynamic system: Definition with example of diathermal wall, adiabatic wall, isolated system, closed system, open system, extensive property, intensive property.

Introduction to first law of thermodynamics: different statements, mathematical form.

Internal energy: Definition, Example, Characteristics, Physical significance, Mathematical expression for change in internal Energy, Expression for change in internal energy for ideal gas.

Enthalpy: Definition, Characteristics, Physical significance, Mathematical expression for change in Enthalpy, Expression for change in enthalpy for ideal gas. 3L

Heat Capacity: Definition, Classification of Heat Capacity (C_p and C_V): Definition and General expression of $C_p - C_V$. Expression of $C_p - C_V$ for ideal gas.

Reversible and Irreversible processes: Definition, Work done in Isothermal Reversible and Isothermal Irreversible process for Ideal gas,

Adiabatic changes: Work done in adiabatic process, Interrelation between thermodynamic parameters (P , V and T), slope of P - V curve in adiabatic and isothermal process.

Application of first law of thermodynamics to chemical processes: exothermic, endothermic processes, law of Lavoisier and Laplace, Hess's law of constant heat summation, Kirchoff's law. 3L

2nd law of thermodynamics: Statement, Mathematical form of 2nd law of thermodynamics (Carnot cycle).

Joule Thomson and throttling processes; Joule Thomson coefficient for Ideal gas, Concept of inversion temperature. 2L

Evaluation of entropy: characteristics and expression, entropy change in irreversible cyclic process, entropy change for irreversible isothermal expansion of an ideal gas, entropy change of a mixture of gases. 2L

Work function and free energy: Definition, characteristics, physical significance, mathematical expression of ΔA and ΔG for ideal gas, Maxwell's Expression (only the derivation of 4 different forms), Gibbs Helmholtz equation. Condition of spontaneity and equilibrium reaction. 2L

Module 2

Electrochemistry:

Conductance Conductance of electrolytic solutions, specific conductance, equivalent conductance, molar conductance and ion conductance, effect of temperature and concentration (Strong and Weak electrolyte).

Kohlrausch's law of independent migration of ions, transport numbers and hydration of ions. Conductometric

titrations: SA vs SB & SA vs WB; precipitation titration KCl vs AgNO₃. 2L

Electrochemical cell:

Cell EMF and its Thermodynamic derivation of the EMF of a Galvanic cell (Nernst equation), single electrode potentials, hydrogen half cell, quinhydrone half cell and calomel half cell, Glass electrode (construction, representation, cell reaction, expression of potential, Discussion, Application)

Storage cell, fuel cell (construction, representation, cell reaction, expression of potential, Discussion, Application). 5L

Module 3

Solid:

Chemical bonding and states of matter Hydrogen bond, metallic bond and their applications. 2L

Solid state Chemistry Introduction to stoichiometric defects (Schottky & Frenkel) and non – stoichiometric defects (Metal excess and metal deficiency).

Conduction in Metal, Semiconductor-n type and p type, Effect of temperature on conductivity , p-n junction, rectifiers, transistors.

Photovoltaic cell, Fabrication of integrated circuits.

Role of silicon and germanium in the field of semiconductor. 4L

Module 4

Polymers and Nanomaterials

Introduction, classification, Hydrocarbon Molecules, Thermoplastic, Thermosetting Polymers. Basic Concepts Molecular Weight, Polymer Crystallinity. Crystallization, Melting and glass transition phenomena,

Polymerization: addition, condensation, Copolymerization, Degree of polymerization, PDI. 3L

Electronic polymers-synthesis, properties, application. 2L

Preparation, properties, engineering applications of: polyethylene, PVC, Bakelite, nylon, natural rubber, vulcanization. elastomers – Buna-s, 2L

Introduction to Nanomaterials- Basic principle of nanoscience and technology, creation and use of buckyballs, structure, properties and uses of Carbon nanotubes, Applications of nanotechnology. 3L

Module 5

Industrial Chemistry

Solid Fuel: Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Coal analysis: Proximate and ultimate analysis.

Liquid fuel: Petroleum, classification of petroleum, Refining, Petroleum distillation, Thermal cracking, Octane number, Cetane number, Aviation Fuel (Aviation Gasoline, Jet Gasoline), Bio-diesel.

Gaseous fuels: Natural gas, water gas, Coal gas, bio gas. 5L

Suggested Text / Reference Books:

1. Sashi Chawla, A Text Book of Engineering Chemistry, Dhanpat Rai & Co.Pvt. Ltd.
2. Engineering Chemistry, P. C. Jain, Dhanpat Rai Publication

3. P. C. Rakshit, Physical Chemistry, Sarat Book House (7th Edition).
4. P. Ghosh, Polymer Science and Technology of Plastics and Rubbers, Tata McGraw Hill Publishing Company Limited.
5. F.W.Billmeyer : Textbook of Polymer Science is published by Wiley India (is now an Indian Imprint.)
6. Joel R. Fried, Polymer Science and Technology, Pearson Education (2nd Edition).
7. I. L. Finar, Organic Chemistry, Addison Wesley Longman, Inc.
8. Physical Chemistry, Atkins, 6th Edition, Oxford Publishers.
9. Organic Chemistry, Mark Loudon, 4th Edition, Oxford Publishers..
10. Concise Inorganic Chemistry, J. D. Lee, Black Well Science

Paper Name: Basic Electronics Engineering

Paper Name:EC201

Contacts: 3L + 1T = 4

Credit:4

Module-I

Semiconductors: Conductors, Semiconductors and Insulators, electrical properties, band diagrams. Intrinsic and extrinsic, energy band diagram, electrical conduction phenomenon, P-type and N-type semiconductors, drift and diffusion carriers.

Diodes and Diode Circuits Formation of P-N junction, energy band diagram, built-in-potential forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode. Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.

Module-II

Bipolar Junction Transistors: Formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode, transistor action and current amplification factors for CB and CE modes. Biasing and Bias stability.

Module-III

Field Effect Transistors: Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles.

Module-IV

Feed Back Amplifier (basic concept), Oscillators and Operational Amplifiers:Concept (Block diagram), properties, positive and negative feedback, loop gain, open loop gain, feedback factors; topologies of feedback amplifier; effect of feedback on gain, output impedance, input impedance, sensitivities (qualitative), bandwidth

stability; effect of positive feedback, instability and oscillation, condition of oscillation, Barkhausen criteria.

Introduction to integrated circuits: Introduction to binary number; Basic Boolean algebra; Logic gates and function realization.

Suggested Text / Reference Books:

1. Millman & Halkias: Integrated Electronics.
2. Sedra & Smith: Microelectronics Engineering.
3. Malvino: Electronic Principle.
4. Schilling & Belove: Electronics Circuits.
5. Millman & Grabal: Microelectronics.
6. Salivahanan: Electronics Devices & Circuits.
7. Boyelstad & Nashelsky: Electronic Devices & Circuit Theory.

Paper Name: Principle of Procedural Programming

Paper Code: IT201

Contacts: 3L+1T

Credit: 3

Fundamentals of Computer:

History of Computer, Generation of Computer, Classification of Computers ,Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices ,Binary & Allied number systems ,representation of signed and unsigned numbers. Basic concepts of Assembly language, high level language, compiler and assembler , Basic concepts of operating system, Concept of Algorithm & flow chart

C Fundamentals:

The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements

Operators & Expressions:

Arithmetic operators, relational and logical operators, type, conversion, increment and decrement operators, bit wise operators, assignment operators and expressions, precedence and order of evaluation. Input and Output: Standard input and output, formatted output -- printf, formatted input scanf.

Flow of Control:

Statement and blocks, if - else, switch, loops - while, for do while, break and continue, go to and labels

Fundamentals and Program Structures:

Basic of functions, function types, functions returning values, functions not returning values, auto, external, static and register variables, scope rules, recursion, function prototypes, C preprocessor, command line arguments.

Arrays and Pointers:

One dimensional arrays, pointers and functions, multidimensional arrays.

Structures Union and Files:

Basic of structures, structures and functions, arrays of structures, bit fields, formatted and unformatted

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files

Text Book:

1. Introduction To Computing (TMH WBUT Series), E. Balagurusamy, TMH
2. Gottfried Programming with C Schaum
3. Kerninghan B.W. & Ritchie D.M. The C Programming Language
4. Sinha & Sinha Fundamental of Computers
5. Kanetkar Y. Let us C

Reference Books:

1. Rajaram Computer Concepts & C Program, Scitech
2. Rajaraman V. Fundamental of Computers

Paper Name: Programming Lab

Paper Code: IT291

Contacts: 3P

Credit: 2

Exercises should include but not limited to:

1. Simple Programs: simple and compound interest. To check whether a given number is a palindrome or not,
2. evaluate summation series, factorial of a number , generate Pascal's triangle, find roots of a quadratic equation
- 3.. Programs to demonstrate control structure : text processing, use of break and continue, etc.
4. Programs involving functions and recursion
5. Programs involving the use of arrays with subscripts and pointers
6. Programs using structures and files.

Paper Name: Engineering Graphics Lab

Paper Code: ME291

Contacts: 1L+3P

Credits: 3

A. THEORETICAL PART

1. Introduction to Lines, Lettering, Dimensioning, Scales. - 1L
2. Geometrical Construction and Curves - 1L
3. Projection of Points, Lines and Surfaces - 2L
4. Projection of Solids - 2L
5. Isometric Views - 1L
6. Sectional Views - 1L
7. Development of Surfaces - 1L
8. Introduction to Computer Aided Drafting - 3L

B. PRACTICAL PART

1. LINES, LETTERING, DIMENSIONING, SCALES; Plain scale, Diagonal scale.- 6hrs
2. GEOMETRICAL CONSTRUCTION AND CURVES; Construction of polygons, Parabola, Hyperbola, Ellipse. - 6hrs
3. PROJECTION OF POINTS, LINES, SURFACES; Orthographic projection- 1st and 3rd angle projection, Projection of lines and surfaces– Hexagon. - 3hrs
4. PROJECTION OF SOLIDS; Cube, Pyramid, Prism, Cylinder, Cone. - 6hrs
5. DRAWING ISOMETRIC VIEW FROM ORTHOGONAL/ SECTIONAL VIEWS OF SIMPLE SOLID OBJECTS. - 3hrs
6. FULL AND HALF SECTIONAL VIEWS OF SOLIDS. - 3hrs
7. DEVELOPMENT OF SURFACES; Prism, Cylinder, Cone. - 3hrs
8. COMPUTER AIDED DRAFTING (Using AutoCAD and/or similar softwares); Introduction: Cartesian and Polar coordinate system, Absolute and Relative coordinates; Basic editing commands: Line, Point, Trace, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline; Editing methods; Basic object selection methods, Window and crossing window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror; Display commands: Zoom, Pan, Redraw, Regenerate; Simple dimensioning and text, Simple exercises. - 6hrs

Suggested Text / Reference Books:

1. Narayana, K.L. and Kannaiah, P. Text Book of Engineering Drawing“Engineering Graphics”, Scitech Publication
2. Bhatt, N.D. “Elementary Engineering Drawing”, Charotar Book Stall, Anand, 1998
3. Lakshminarayanan, V. and Vaish Wanar, R.S., “Engineering Graphics”, Jain Brothers, New Delhi, 1998
4. Chandra, A.M. and Chandra Satish, “Engineering Graphics”, Narosa, 1998
5. Jolhe, “Engineering Graphics”, Tata McGraw-Hill- WBUT Series
6. Gill, P.S., “A Text Book of Engineering Drawing”, Katson Publishing House (Kataria and Sons)
7. Venugopal, K., “Engineering Drawing & Graphics + AutoCAD”, New Age International
8. Ventaka Reddy K., “Text Book of Engineering Drawing (2nd Edition)”, BS Publication.

Paper Name: Engineering Chemistry Lab

Paper Code: CH 291(IT&CSE)

Contact: 3P

Credits: 2

Any six experiments

1. To Determine the alkalinity in a given water sample.
2. Red-ox titration (estimation of iron using permanganometry)
3. To determine calcium and magnesium hardness of a given water sample separately.
4. To determine the value of the rate constant for the hydrolysis of ethyl acetate catalyzed by hydrochloric acid.
5. Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and

water)

6. Viscosity of solutions (determination of percentage composition of sugar solution from viscosity)
7. Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution.
8. pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution.
9. Determination of dissolved oxygen present in a given water sample.
10. To determine chloride ion in a given water sample by Argentometric method (using chromate indicator solution)

Paper Name: Basic Electronics Engineering Lab

Paper Code: EC291

Contact: 3P

Credits: 2

Familiarisation with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT, FET) and electronic equipment like DC power supplies, multi-meters etc.

Familiarisation with measuring and testing equipment like CRO, Signal generators etc.

Study of I-V characteristics of Junction diodes.

Study of I-V characteristics of Zener diodes.

Study of Half and Full wave rectifiers with Regulation and Ripple factors.

Study of I-V characteristics of BJTs (CE, CB).

Study of I-V characteristics of FETs (CS, CD).

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2nd Year - Semester 3

Paper code	Name of the subjects	Periods			Credits	Total Credits	Marks		
		L	T	P			IE	FE	Total Marks
M301	Mathematics-III (Discrete Mathematics and Graph theory)	3	1	0	4	40	30	70	100
PH301 (IT)	Physics –II	3	1	0	4	40	30	70	100
IT301 (EC)	Digital Electronics	3	1	0	4	40	30	70	100
IT302	Data Structures and Algorithms	3	1	0	4	40	30	70	100
IT303	Numerical Methods	3	1	0	3	30	30	70	100
PH391	Physics II Lab	0	0	3	2	20	40	60	100
IT391 (EC)	Digital Electronics Lab	0	0	3	2	20	40	60	100
IT392	Data Structures and Algorithms Lab using C	0	0	3	2	20	40	60	100
IT393	Numerical Methods & Programming Lab	0	0	3	2	20	40	60	100
	Total	15	5	12	27	270	310	590	900

Bachelor of Technology in Information Technology

2nd Year - Semester 3

Paper Name: Mathematics-III (Discrete Mathematics and Graph theory)

Paper Code: M301

Contacts:3L+1T

Credits:4

Module I:

Introduction to Propositional Calculus: Propositions, Logical Connectives, Conjunction, Disjunction, Negation and their truth table. Conditional Connectives, Implication, Converse, Contrapositive, Inverse, Biconditional statements with truth table, Logical Equivalence, Tautology, Normal forms-CNF, DNF and related examples.

Module II:

Order, Relation and Lattices: POSET, Hasse Diagram, Minimal, Maximal, Greatest and Least elements in a POSET, Lattices and its properties, Principle of Duality, Distributive and Complemented Lattices. 10L

Module III:

Counting Techniques: Permutations, Combinations, Binomial coefficients, Pigeon-hole Principle, Principles of inclusion and exclusions;

Module IV

Recurrence relations: Formulation/Modelling of different counting problems in terms of recurrence relations, Solution of linear recurrence relations with constant coefficients (upto second order) by (i) The iterative method (ii) Characteristic roots method (iii) Generating functions method.

Module V:

Graph Coloring: Chromatic Numbers and its bounds, Independence and Clique Numbers, Perfect Graphs-Definition and examples, Chromatic polynomial and its determination, Applications of Graph Coloring.

Matchings: Definitions and Examples of Perfect Matching, Maximal and Maximum Matching, Hall's Marriage Theorem (Statement only) and related problems.

Suggested Text / Reference Books:

Texts:

1. Russell Merris, Combinatorics, Wiley-Interscience series in Discrete Mathematics and Optimisation
2. N. Chandrasekaran and M. Umaparvathi, Discrete Mathematics, PHI
3. Gary Haggard, John Schlipf and Sue Whitesides, Discrete Mathematics for Computer Science, CENGAGE Learning
4. Gary Chartrand and Ping Zhang – Introduction to Graph Theory, TMH

References:

1. J.K. Sharma, Discrete Mathematics, Macmillan
2. Winfried Karl Grassmann and Jean-Paul Tremblay, Logic and Discrete Mathematics, PEARSON.
3. S. K. Chakraborty and B. K. Sarkar, Discrete Mathematics, OXFORD University Press.
4. Douglas B. West, Introduction to graph Theory, PHI

Paper Name: PHYSICS-II

Paper Code: PH(IT) 301

Contacts:3L+1T

Credits:4

Module 1: Quantum Mechanics-II, Quantum Computation and Communication

1.01: Vector space & Heisenberg representation: Elements of linear vector spaces- The idea of n- dimensional vector space, use of 'bra-ket' notation, linear independence, basis, inner product, norm of a vector; Hilbert space, Ortho normality; Matrix representation of bra & kets; linear operators; Pauli matrices; Definitions of Hermitian, Inverse and Unitary operators; Commutators; Tensor products. 4L

1.02: Quantum Computation & Communication: Idea of 'qubit' and examples of single qubit logic gates- Classical bits, Qubit as a two level system; Bloch vector representation of state of qubit; Polarization states of photon and measurements; Pauli gates, Phase shift gate, Quantum gates as rotations in Bloch sphere; concept of entanglement. Bell's inequality- the paradox, joint state of entangled particles; Two-qubit controlled gates; entanglement generation Quantum circuit for transforming computational basis to Bell basis; Quantum Teleportation (Basic idea) 6L

Module 2: PHYSICS OF SEMICONDUCTORS & ENERGY BAND THEORY

2.01: Applications of Schrödinger's equation – Finite Potential Barrier, WKB approximation (qualitative) -connection with semiconductor diode- tunneling effect. 3L

2.02: Free electron theory- Free electron theory-Drude model (qualitative), Ohm's law, Wideman Franz law, Electron scattering and resistance, relaxation time, diffusion length, mean free path. 2L

2.03: Band Theory: Introduction to Band theory (mention qualitatively improvement over free electron theory)- Kronig-Penny model (Use Schrödinger picture to obtain Energy-band (E-k) diagram), formation of allowed and forbidden energy bands, Concept of effective mass – electrons and holes, crystal momentum, Density of states (qualitative), Energy bands of metal, insulator, semiconductor, magneto-resistance, magnetostriction, Piezoelectric effect, Hall effect-applications. 3L

2.04 : Semiconductors and insulators: Direct & indirect band gaps, Fermi-Dirac distribution function (temperature dependence-qualitative discussions). Fermi level for intrinsic and extrinsic semiconductors (dependence on temperature and doping concentration viz. p type, n-type), Diffusion and drift current (qualitative). Generation and re-combination, quasi-Fermi energy level (basic concepts) band diagram of p-n, Schotkey diode, BJT and MOS-capacitors-principle of operation, Flat band and threshold voltages. 5L

Module 3: SOLID STATE ELECTRONIC & OPTO ELECTRONIC DEVICES

3.01: SOLID STATE ELECTRONICS DEVICES: Classification of different types of diode on the basis of doping concentration: rectifier diode (qualitative idea), Zener diode (qualitative idea), tunnel diode, IMPATT diode (importance

of negative resistance), PNP transistors - simple working principle, I-V characteristics, triggering-operating principle & application. 3L

3.02: Field effect transistors: Basic principles of p and n channel MOSFETS, CMOS, NMOS and VLSI MOSFETS-applications. 2L

3.03 Sensor & Detectors: Semiconductor sensors and detectors-applications-Charge Coupled device (CCD). 1L

3.04: OPTO ELECTRONIC DEVICES: Basic background of photonic devices, Photoconductivity, Optical devices, Importance of reverse current in optical detectors, photo-diodes, photo voltaic effects (solar cells), Light Emitting Diode (as direct band gap material), avalanche and photodiode, Photo-transistors (Basic idea & application), LDR-operation & applications. 3L

Module 4: Storage & Display devices:

4.01: Storage devices: Magnetic field and Magnetization; Magnetic susceptibility, Paramagnetism, Concept of magnetic moment, Bohr Magneton, Curie's Law; Ferromagnetism, phenomenon of hysteresis-hysteresis loss, Hard ferromagnets, applications of permanent magnets; Comparison and applications of Soft ferromagnets (Permalloys, Ferrites). Magnetic resonance, NMR and MRI (qualitative discussions related to applications). 4L

4.02: Different Magnetic storage devices-Hard disc (examples related to computers compared with semiconductor storage viz. Pendrive), Optical storage-CD, DVD, Blu-ray Disc. 2L

4.03: Display devices:

Operation and application of CRT, Liquid crystal display (LCD, LED, Plasma display, Thin film transistor display). 2L

List of Assignments/Tests:

- 15 marks Internal test 1 & Internal test 2 (best of the two would be considered)
- Assignments in regular classes, tutorial classes, surprise tests or through Problem oriented guided inquiry learning (POGIL)

Suggested Text / Reference Books:

Module 1: Quantum Mechanics-II, Quantum Computation and Communication

1. Advanced Quantum Mechanics-J. J. Sakurai (TMH)
2. Quantum Mechanics-Schiff (Addison-Wesley)
3. Quantum Computation and Quantum Information(10th Anniversary Edition)-Nielsen & Chuang (Cambridge University Press)
4. The physics of quantum information-Dirk Bouwmeester, Artur K. Ekert, Anton Zeilinger (Springer)
5. Quantum Mechanics-Cohen Tanuje.

Module 2: PHYSICS OF SEMICONDUCTORS & ENERGY BAND THEORY

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1. Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)
2. Quantum Mechanics-Bagde Singh (S. Chand Publishers)
3. Perspective of Quantum Mechanics-S. P. Kuilla (New Central Book Agency)
3. Solid state physics- S. O. Pillai
4. Introduction to solid state physics-Kittel (TMH)
5. Solid State Physics- Ali Omar (Pearson Education)
6. Integrated Electronics-Millman Halkias (TMH)
7. Solid State Physics-A. J. Dekker (Prentice-Hall India)

Module 3: SOLID STATE ELECTRONIC & OPTO ELECTRONIC DEVICES

1. Solid state electronics-S. M. Zee & Sanjoy Banerjee
2. Optoelectronic devices-Pallab Bhattacharjee

Module 4: Storage devices & Applications

- 1 Introduction to solid state physics-Kittel (TMH)
2. Solid State Physics- Ali Omar (Pearson Education)
3. Solid state physics- S. O. Pillai
4. Solid State Physics-A. J. Dekker (Prentice-Hall India)
5. Materials Science-Raghavan

PHYSICS-II SYLLABUS, Paper Code: PH 301 (IT) (PROPOSED) AS PER MODULES & EXAM-GROUP* DIVISION

STREAM	MODUL E-1	MODULE-2	MODULE -3	MODUL E-4	GR-A *	GR-B*
IT	Quantum Mechanics-II, Quantum Computation and Communication 4+6=10L	PHYSICS OF SEMICONDUCTORS & ENERGY BAND THEORY 2+2+4+3=11L	SOLID STATE ELECTRONIC & OPTOELECTRONIC DEVICES 3+4+4=11L	Storage & Display devices 8L	1.01: Vector space & Heisenberg representation (4L) 2.01: Applications of Schrödinger's equation (2L) 2.02: Free electron theory (2L) 2.03: Energy Band Theory (4L) 3.01: SOLID STATE ELECTRONICS DEVICES (3L) 4.01: Storage devices. (5L)	1.01: Quantum Computation & Communication (6L) 2.04 : Semiconductors and insulators (3L) 3.02: Field effect transistors (4L) 3.03: OPTOELECTRONIC DEVICES (4L) 4.02: Display devices (3L)

Paper Name: Digital Electronics
Paper Code: IT301(EC)
Contacts:3L+1T

Credits:4

Number systems and arithmetic (Fixed and floating point), Combinational logic analysis and design: logic minimisation methods, Combinational logic circuits: adder, subtractor, multiplexer, demultiplexer, encoder, decoder, comparator; Logic families (TTL, ECL, CMOS, BICMOS), Delay, Hazards. Sequential logic design: latches and flip-flops (SR,D,JK,T), Setup and Hold time , Clock frequency, Finite state machine design, ASM charts, state minimization, state assignment, synthesis using D-FF and JK-FF, counters, shift registers, MSI devices as state machines, Memory cells.

Suggested Text / Reference Books:

1. J.F.Wakerly, Digital Design Principles and Practices, PH, 1999.
2. D.D. Givone, Digital Principles and Design, TMH, 2002
3. M. Raffiquzzman & Rajan Chandra, Modern Computer Architecture, Galgotia Publications, 1990.
4. David Patterson and John Hennessy, Computer Organization and Design, Elsevier, 2007.
5. MALVINO LEACH

Data Structure & Algorithm

Code: IT302

Contacts: 3L +1T

Credits: 4

Module -I. Linear Data Structure[8]

Introduction (2L):

Concepts of data structures: a) Data and data structure b) Abstract Data Type and Data Type.

Algorithms and programs, basic idea of pseudo-code.

Algorithm efficiency and analysis, time and space analysis of algorithms – order notations.

Array (2L):

Different representations – row major, column major. Sparse matrix - its implementation and usage. Array representation of polynomials.

Linked List (4L):

Singly linked list, circular linked list, doubly linked list, linked list representation of polynomial and applications.

Module -II: Linear Data Structure[7]

[Stack and Queue (5L):

Stack and its implementations (using array, using linked list), applications.

Queue, circular queue, dequeue. Implementation of queue- both linear and circular (using array, using linked list), applications.

Recursion (2L):

Principles of recursion – use of stack, differences between recursion and iteration, tail recursion.

Applications - The Tower of Hanoi, Eight Queens Puzzle.

Module -III. Nonlinear Data structures [15]

Trees (9L):

Basic terminologies, forest, tree representation (using array, using linked list).

Binary trees - binary tree traversal (pre-, in-, post- order), threaded binary tree (left, right, full) - non-recursive traversal algorithms using threaded binary tree, expression tree.

Binary search tree- operations (creation, insertion, deletion, searching).

Height balanced binary tree – AVL tree (insertion, deletion with examples only).

B- Trees – operations (insertion, deletion with examples only).

Graphs (6L):

Graph definitions and Graph representations/storage implementations – adjacency matrix, adjacency list, adjacency multi-list.

Graph traversal and connectivity – Depth-first search (DFS), Breadth-first search (BFS) – concepts of edges used in DFS and BFS (tree-edge, back-edge, cross-edge, forward-edge), applications.

Minimal spanning tree – Prim's algorithm

Module - IV. Searching, Sorting:[10L]

Sorting Algorithms (5L): Bubble sort and its optimizations, insertion sort, shell sort, selection sort, merge sort, quick sort, heap sort (concept of max heap), radix sort.

Searching (2L): Sequential search, binary search, interpolation search.

Hashing (3L): Hashing functions, collision resolution techniques.

Suggested Text / Reference Books:

1. “Data Structures And Algorithm using C”, Amitiva Nag, J.P.Singh
2. “Fundamentals of Data Structures of C” by Ellis Horowitz, Sartaj Sahni, Susan Anderson-freed.
3. “Data Structures in C” by Aaron M. Tenenbaum.
4. “Data Structures” by S. Lipschutz.
5. “Data Structures Using C” by Reema Thareja.
6. “Data Structure Using C”, 2/e by A.K. Rath, A. K. Jagadev.
7. “Introduction to Algorithms” by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.

Paper Name: Numerical Methods

Paper Code: IT303

Contacts:3L+1T

Credits:3

Module 1

Approximation in numerical computation:

Truncation and rounding errors, Fixed and floating-point arithmetic, Propagation of errors [2]

Module 2

Basic concept of C programming Language:

Datatype, Variable, Control Statements, Arrays, Functions. [5]

Module 3

Interpolation:

Newton forward/backward interpolation, Lagrange’s and Newton’s divided difference Interpolation. [6]

Module 4

Numerical solution of Algebraic equation:

Bisection method, Regula-Falsi method, Newton-Raphson method, Secant’s method. [6]

Module 5

Numerical Differentiation & Integration:

Numerical Differentiation, Numerical Integration using Trapezoidal rule, Simpson’s 1/3 rule, Expression for corresponding error terms. [6]

Module 6

Numerical solution of a system of linear equations:

Gauss elimination method, Gauss- Jordan method, Matrix inversion, LU Factorization method, Jacobi iterative method, Gauss-Seidel iterative method. [8]

Module 7

Numerical solution of ordinary differential equation:

Euler’s method, Modified Euler’s method, Taylor’s Series, Runge-Kutta methods, Predictor-Corrector methods.[9]

Suggested Text / Reference Books:

Text Books:

1. Dutta & Jana: Introductory Numerical Analysis, Shreedhar Prakashani.
2. Sastry: Introductory Methods of Numerical Analysis, PHI.
3. Let us C: Kanetkar, Yash Publication.

Reference Books:

1. Dey & Gupta: Numerical methods, TMH.
2. Mollah & Chakrabarty: Computing Systems, JBBL.
3. Sinha & Dinda: Numerical & Statistical Methods with Programming in C, Scitech.

Paper Name: Physics-II LAB

Paper Code: PH(IT) 391

Contact: 3

Credits: 2

Any 7 to be performed from the following experiments

Experiments on PHYSICS OF SEMICONDUCTORS & ENERGY BAND THEORY

1. Determination of band gap of a semiconductors/thermistor.
2. Determination of Hall co-efficient of a semiconductors.
3. Measurement of Magnetoresistance of a semiconductor.
4. Determination of velocity of ultrasonic wave using piezoelectric crystal & compressibility of the given liquid.

Experiments on SOLID STATE ELECTRONIC & OPTO ELECTRONIC DEVICES

5. To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells & measurement of maximum workable power.
6. Study of I-V characteristics of a thyristor
7. Study of I-V characteristics of a LED.
8. Study of phototransistor.
9. Study of a temperature sensor characteristics.
10. Study of I-V characteristics of Tunnel diode.
11. Study of LDR characteristics.

Experiments on Magnetism & Storage devices

12. Study of hysteresis curve of a ferromagnetic material using CRO.
13. Use of paramagnetic resonance and determination of lande-g factor using esr setup.
14. Measurement of Curie temperature of the given sample.
15. Study of dipolar magnetic field behavior.

Paper Name: Digital Electronics Lab

Paper Code: IT391(EC)

Contact: 3

Credits: 2

Digital Circuit design using SSI/MSI:
Combinational Circuit design using gates,
MUX, decoders, arithmetic circuits,
ALU Sequential Circuits design - counters, shift registers,
sequence generators, signature detectors.

Paper Name: Data Structure & Algorithm Lab using C

Paper Code: IT392

Contacts: 3

Credits: 2

Experiments should include but not limited to :

Implementation of array operations:

Stacks and Queues: adding, deleting elements Circular Queue: Adding & deleting elements Merging Problem :

Evaluation of expressions operations on Multiple stacks & queues :

Implementation of linked lists: inserting, deleting, inverting a linked list. Implementation of stacks & queues using linked lists:

Polynomial addition, Polynomial multiplication

Sparse Matrices : Multiplication, addition.

Recursive and Nonrecursive traversal of Trees

Threaded binary tree traversal. AVL tree implementation

Application of Trees. Application of sorting and searching algorithms

Hash tables implementation: searching, inserting and deleting, searching & sorting techniques.

Paper Name: Numerical Methods Lab

Paper Name: IT393

Contacts: 3

Credits: 2

1. Assignments on Newton forward /backward, Lagrange's interpolation.

2. Assignments on numerical solution of Algebraic Equation by Bisection, Regular-falsi and Newton Raphson, Secant's methods.

3. Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule

4. Assignments on numerical solution of a system of linear equations using Gauss elimination and Gauss-Seidel iterations

5. Assignments on ordinary differential equation: Euler's and Runge-Kutta methods

Course Structure and Syllabus for Under Graduate Programme
Department of Information Technology, JIS College of Engineering
(An Autonomous Institution)

Bachelor of Technology in Information Technology

2st Year - Semester 4

Paper code	Name of the subjects	Periods			Credits	Total Credits	Marks		
		L	T	P			IE	FE	Total Marks
IT401	Computer Organization & Architecture	3	1	0	4	40	30	70	100
IT402	Operating System	3	1	0	4	40	30	70	100
IT403	Database Management System- I	3	1	0	4	40	30	70	100
IT404	Object Technology & UML	3	0	0	3	30	30	70	100
IT405	Formal Language and Automata Theory	3	1	0	3	30	30	70	100
IT491	Computer Organization & Architecture Lab	0	0	3	2	20	40	60	100
IT492	Operating System Lab	0	0	3	2	20	40	60	100
IT493	Database Management System- I Lab	0	0	3	2	20	40	60	100
IT494	Object Technology & UML Lab	0	0	3	2	20	40	60	100
IT495	Visual Programming Lab	0	0	3	2	20	40	60	100
HU481	Technical Report Writing & Language Laboratory	1	0	2	2	20	40	60	100
	Total	16	4	17	30	300	390	710	1100

Paper Name: Computer Organization & Architecture

Paper Code: IT401

Contacts: 3L+1T

Credits:4

Pre-requisite: Concept of basic components of a digital computer, Basic concept of Fundamentals & Programme

structures. Basic number systems, Binary numbers, representation of signed and unsigned numbers, Binary Arithmetic as covered in Basic Computation & Principles of Computer Programming Second semester, first year. Boolean Algebra, Karnaugh Maps, Logic Gates – covered in Basic Electronics in First year

Module – 1: [8L]

Basic organization of the stored program computer and operation sequence for execution of a program.

Role of operating systems and compiler/assembler.

Fetch, decode and execute cycle, Concept of operator, operand, registers and storage, Instruction format.

Instruction sets and addressing modes. [7L]

Module – 2: [8L]

Overflow and underflow. Design of adders - ripple carry and carry look ahead principles. [3L]

Design of ALU. [1L]

Fixed point multiplication -Booth's algorithm. [1L]

Fixed point division - Restoring and non-restoring algorithms. [2L]

Floating point - IEEE 754 standard. [1L]

Module – 3: [13L]

Memory unit design with special emphasis on implementation of CPU-memory interfacing. [2L]

Memory organization, static and dynamic memory, memory hierarchy, associative memory. [3L]

Inclusion, Coherence and locality properties; Cache memory organizations, Techniques for reducing cache misses; Virtual memory organization, mapping and management techniques, memory replacement policies. (8L)

Module – 4: [13L]

Design of control unit - hardwired and microprogrammed control. [3L]

Introduction to RISC architectures. RISC vs CISC architectures. [2L]

I/O operations - Concept of handshaking, Polled I/O, interrupt and DMA. [3L]

Pipelining: Basic concepts, instruction and arithmetic pipeline, data hazards, control hazards and structural hazards, techniques for handling hazards. Exception handling. Pipeline optimization techniques; [5L]

Module – 5: [6L]

Instruction-level parallelism: basic concepts, techniques for increasing ILP, superscalar, superpipelined and VLIW processor architectures. Array and vector processors. (6L)

Module – 6: [12 L]

Multiprocessor architecture: taxonomy of parallel architectures; Centralized shared- memory architecture:

synchronization, memory consistency, interconnection networks. Distributed shared-memory architecture. Cluster computers. (8L)

Non von Neumann architectures: data flow computers, reduction computer architectures, systolic architectures. (4L)

Suggested Text / Reference Books:

Text Books:

1. Mano, M.M., “Computer System Architecture”, PHI.
2. Kai Hwang”Advance Computer Architecture” McGraw Hill
3. Behrooz Parhami “ Computer Architecture”, Oxford University Press
4. Nicholas P Carter”Computer Architecture & Organization” McGraw Hill,

Reference Book:

1. Hayes J. P., “Computer Architecture & Organisation”, McGraw Hill,
2. Hamacher, “Computer Organisation”, McGraw Hill,
3. N. senthil Kumar, M. Saravanan, S. Jeevananthan, “Microprocessors and Microcontrollers” OUP
4. Chaudhuri P. Pal, “Computer Organisation & Design”, PHI,
5. P N Basu- “Computer Organization & Architecture” , Vikas Pub

Paper Name: Operating System

Paper Code:IT402

Contacts: 3L+1T

Credits:4

Introduction [4L]

Introduction to OS. Operating system functions, evaluation of O.S., Different types of O.S.: batch, multi-programmed, timesharing,real-time, distributed, parallel.

System Structure[3L]

Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

Process Management [17L]

Processes [3L]: Concept of processes, process scheduling, operations on processes, co-operating processes, interprocess communication.

Threads [2L]: overview, benefits of threads, user and kernel threads.

CPU scheduling [3L]: scheduling criteria, preemptive & non-preemptive scheduling, scheduling algorithms (FCFS,SJF, RR, priority), algorithm evaluation, multi-processor scheduling.

Process Synchronization [5L]: background, critical section problem, critical region, synchronization hardware,

classical problems of synchronization, semaphores.

Deadlocks [4L]: system model, deadlock characterization, methods for handling deadlocks, deadlock prevention,deadlock avoidance, deadlock detection, recovery from deadlock.

Storage Management [19L]

Memory Management [5L]: background, logical vs. physical address space, swapping, contiguous memory allocation,paging, segmentation, segmentation with paging.

Virtual Memory [3L]: background, demand paging, performance, page replacement, page replacement

algorithms (FCFS, LRU), allocation of frames, thrashing.

File Systems [4L]: file concept, access methods, directory structure, file system structure, allocation methods

(contiguous, linked, indexed), free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency & performance.

I/O Management [4L]: I/O hardware, polling, interrupts, DMA, application I/O interface (block and character devices, network devices, clocks and timers, blocking and nonblocking I/O), kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation, error handling), performance.

Disk Management [3L]: disk structure, disk scheduling (FCFS, SSTF, SCAN, C-SCAN), disk reliability, disk formatting, boot block, bad blocks.

Protection & Security [4L]

Goals of protection, domain of protection, security problem, authentication, one time password, program threats, system threats, threat monitoring, encryption.

Suggested Text / Reference Books:

1. Milenkovic M., "Operating System : Concept & Design", McGraw Hill.
2. Tanenbaum A.S., "Operating System Design & Implementation", Practice Hall NJ.
3. Silbersehatz A. and Peterson J. L., "Operating System Concepts", Wiley.
4. Dhamdhere: Operating System TMH
5. Stallng, William, "Operating Systems", Maxwell McMillan International Editions, 1992.
6. Dietel H. N., "An Introduction to Operating Systems", Addison Wesley.

Paper Name: Database Management System-I

Paper Code: IT403

Contacts: 3L+1T

Credits: 4

Introduction [2L]

Why Database: Relation among DB, DBMS and DBS, Characteristics of Data in Database, Advantage of DBMS over FPS. Database models, Database Users, Role of DBA, Three Schema architecture of DBMS.

Entity Relationship Model [3L]

Components of ER Model, ER Modeling Symbols, Attribute inheritance, Extended E-R features: Super Class and Sub class types.

Relational DBMS [8L]

Introduction to Relational DBMS, RDBMS Terminology. Keys, Relationships, First Normal Form, Functional dependencies, Second Normal form, Third Normal Form, Boyce-Codd Normal form, Fourth Normal Form, Fifth Normal form, Case study.

Relational Algebra and Relational Calculus [4L]

Structure of relational Databases, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Views, Modifications Of the Database.

Introduction to SQL [8L]

History of SQL, Characteristics of SQL, Advantages of SQL, SQL in Action SQL data types and Literals, Types of SQL commands, SQL Operators and their precedence, Tables, Views and indexes, Queries and Sub Queries, Aggregate functions, Insert, Update and Delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL, Embedded SQL.

Internals of RDBMS [6L]

Physical data structures, Query optimization : join algorithm, statistics and cost based optimization. Transaction processing, Concurrency control and Recovery Management : transaction model properties, Serializability, lock base protocols, two phase locking, Timestamp protocol.

File Organization & Index Structures [6L]

File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary, secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree and hash tree .

Backup and Recovery [4L]

Database backups, Why plan backups?, Hardware protection and redundancy, Transaction logs, Database recovery, Data storage, Causes and classification of failures, Recovery concepts and terminology, Recovery facilities, Recovery techniques, Disaster Database Management System.

Database Security and Integrity [4L].

Types of Integrity constraints, Restrictions on integrity constraints, Data security Risks, Complex user management requirements, Dimensions of security, Data security requirements, Protecting data with in the database, Granting and revoking privileges and roles, System viability Factors, Authenticating users to the database.

Suggested Text / Reference Books:

Text Books:

1. Henry F. Korth and Silberschatz Abraham, “Database System Concepts”, Mc.Graw Hill.
2. Elmasri Ramez and Novathe Shamkant, “Fundamentals of Database Systems”, Benjamin Cummings Publishing. Company.
3. Ramakrishnan: Database Management System , McGraw-Hill
4. Gray Jim and Reuter Address, “Transaction Processing : Concepts and Techniques”, Moragan Kauffman Publishers.
5. Jain: Advanced Database Management System CyberTech
6. Date C. J., “Introduction to Database Management”, Vol. I, II, III, Addison Wesley.
7. Ullman JD., “Principles of Database Systems”, Galgottia Publication.

Reference:

1. James Martin, “Principles of Database Management Systems”, 1985, Prentice Hall of India, New Delhi
2. “Fundamentals of Database Systems”, Ramez Elmasri, Shamkant B.Navathe, Addison Wesley Publishing Edition
3. “Database Management Systems”, Arun K.Majumdar, Pritimay Bhattacharya, Tata McGraw Hill

Paper Name: Object Technology & UML

Paper Code: IT404

Contacts: 3L+1T

Credits:3

Prerequisites of Object Oriented Programming & UML:

The fundamental point in learning programming is to develop the critical skills of formulating programmatic solutions for real problems. It will be based on basic knowledge of algorithms and procedural programming language. Once the basic skill of writing programs using loop, methods and

arrays will be clear then the student can develop object oriented software using class encapsulation and inheritance.

Object oriented design [10 L]

Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.

Object oriented concepts [4 L]

Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism

Basic concepts of object oriented programming using Java [22 L]

Implementation of Object oriented concepts using Java. Language features to be covered:

Class & Object properties [6L]

Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String (discuss charAt() , compareTo(), equals(), equalsIgnoreCase(), indexOf(), length() , substring(), toCharArray() , toLowerCase(), toString(), toUpperCase() , trim() , valueOf() methods) & StringBuffer classes (discuss append(), capacity(), charAt(), delete(), deleteCharAt(), ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(), setLength(), substring(), toString() methods), concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.

Reusability properties [6L] – Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.

Exception handling & Multithreading [6L] – Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes.

Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread

synchronization, inter-thread communication, deadlocks for threads, suspending & resuming threads.

Applet Programming (using swing) [4L] – Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton class only) & text fields.

Textbooks/References:

1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India
2. Ali Bahrami – "Object Oriented System Development" – Mc Graw Hill
3. Patrick Naughton, Herbert Schildt – "The complete reference-Java2" – TMH
4. R.K Das – "Core Java For Beginners" – VIKAS PUBLISHING
5. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson
6. Ivor Horton's Beginning Java 2 SDK – Wrox
7. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – TMH

Paper Name: Formal Language and automata Theory

Paper Code: IT405

Contacts: 3L+1T

Credits:3

Module 1:

Fundamentals: Basic definition of sequential circuit, block diagram, mathematical representation, concept of transition table and transition diagram (Relating of Automata concept to sequential circuit concept)

Design of sequence detector, Introduction to finite state model

Finite state machine: Definitions, capability & state equivalent, kth- equivalent concept, Finite memory definiteness, testing table & testing graph.

Minimization of FSM-completely specified and incompletely specified(Merger graph, Merger table, Compatibility graph)

Equivalence between two FSM's, Limitations of FSM

Application of finite automata, Finite Automata with output- Moore & Melay machine. [11]

Module 2:

Deterministic finite automaton and non deterministic finite automaton. Transition diagrams and Language recognizers.

Finite Automata: NFA with \hat{I} transitions - Significance, acceptance of languages.

Conversions and Equivalence: Equivalence between NFA with and without \hat{I} transitions. NFA to DFA conversion. DFA minimization. Myhill- Nerode theorem

Regular Languages : Regular sets.Regular expressions, identity rules. Arden's theorem state and prove

Constructing finite Automata for a given regular expressions, Regular string accepted by NFA/DFA .

Pumping lemma of regular sets. Closure properties of regular sets (proofs not required).

Grammar Formalism: Regular grammars-right linear and left linear grammars.Equivalence between regular linear grammar and FA.[10]

Module 3:

Context free grammar. Derivation trees, sentential forms. Right most and leftmost derivation of strings. (Concept only)

Context Free Grammars, Ambiguity in context free grammars. Minimization of Context Free Grammars. Chomsky normal form and Greibach normal form.[9]

Pumping Lemma for Context Free Languages. Enumeration of properties of CFL (proofs omitted). Closure property of CFL, Ogden's lemma & its applications .

Push Down Automata: Push down automata, definition.

Acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence.

Equivalence of CFL and PDA, interconversion.Introduction to DCFL and DPDA. [9]

Module 4:

Turing Machine : Turing Machine, definition, model [1L]

Design of TM, Computable functions,Church's hypothesis, counter machine,Types of Turing machines

Universal Turing Machine, Halting problem[6]

Suggested Text / Reference Books:

Text Books:

1. Switching & Finite Automata, ZVI Kohavi, 2nd Edn., Tata McGraw Hill

2. An Introduction to Computing, Peter Linz, Narosa. Reference Books:

3. Introduction to Automata Theory Language and Computation", Hopcroft H.E. and Ullman J. D.,

Pearson education.

4 .Theory of Computer Science “, Automata Languages and computation”, Mishra and Chandrashekar, 2nd edition, PHI.

5. Formal Languages and Automata Theory, C.K.Nagpal, Oxford.

6. Introduction to languages and the Theory of Computation, John C Martin, TMH

7. Theory of Computation ,Verma & Rao.SCITECH edition.

Paper Name: Computer Organization & Computer Architecture Lab

Paper Code: IT491

Contacts:3P

Credits:2

1. Implementation of simple 8-to-1 line and 4-to-1 line Multiplexer
2. Realization of the basic gates (AND, OR, NOR, NOT, NAND).
3. Implementation of HALF ADDER circuit using basic gates and verify its output.
4. Implementation of FULL ADDER circuit using basic gates and verify its output.
5. Implementation of HALF SUBTRACTOR circuit using basic gates and verify its output.
6. Implementation of FULL SUBTRACTOR circuit using basic gates and verify its output.
7. Implementation of 1:4 De-Multiplexer and 1:8 De-Multiplexer
8. Implementation of 2:4 decoder and 3:8 Decoder using logic gates.
9. Implementation of 4:2 Encoder and 8:3 En coder using logic gates.
10. Implementation of Binary to its corresponding Gray conversion and vice versa.
11. Implementation of 4-bit Comparator.
12. Implementation of D-Flip-Flop and SR- Flip-Flop,JK Flip-Flop and T Flip-Flop.
13. Implementation of Circuit for 8-bit adder.
14. Implementation of ALU Design.
15. Implementation of CPU Design.

Paper Name: Operating System Lab

Paper Code:IT492

Contacts: 3P

Credits:2

1. Managing Unix/Linux Operating System [8P]:

Creating a bash shell script, making a script executable, shell syntax (variables, conditions, control structures, functions, commands). Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Backup schedules and methods Kernel loading, init and the inittab file, Run-levels, Run level scripts. Password file management, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user-management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users & user groups.

2. **Process [4P]:** starting new process, replacing a process image, duplicating a process image, waiting for a process, zombie process.

3. **Signal [4P]:** signal handling, sending signals, signal interface, signal sets.

4. **Semaphore [6P]:** programming with semaphores (use functions semctl, semget, semop, set_semvalue, del_semvalue, semaphore_p, semaphore_v).

5. **POSIX Threads [6P]:** programming with pthread functions (viz. pthread_create, pthread_join, pthread_exit,

pthread_attr_init, pthread_cancel)

6. **Inter-process communication [6P]**: pipes(use functions pipe, popen, pclose), named pipes(FIFOs, accessing FIFO),message passing & shared memory(IPC version V).

Paper Name: Database Management System-I Lab

Paper Code:IT493

Contacts: 3P

Credits:2

Structured Query Language

1. Creating Database

- _ Creating a Database
- _ Creating a Table
- _ Specifying Relational Data Types
- _ Specifying Constraints
- _ Creating Indexes

2. Table and Record Handling

- _ INSERT statement
- _ Using SELECT and INSERT together
- _ DELETE, UPDATE, TRUNCATE statements
- _ DROP, ALTER statements

3. Retrieving Data from a Database

1. The SELECT statement
2. Using the WHERE clause
3. Using Logical Operators in the WHERE clause
4. Using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING

Clause

5. Using Aggregate Functions
6. Combining Tables Using JOINS
7. Subqueries

4. Database Management

- _ Creating Views
- _ Creating Column Aliases
- _ Creating Database Users
- _ Using GRANT and REVOKE

Cursors in Oracle PL / SQL

Writing Oracle PL / SQL Stored Procedures

Paper Name: Object Technology & UML Lab

Paper Code:IT494

Contacts: 3P

Credits:2

1. Assignments on class, constructor, overloading, inheritance, overriding
2. Assignments on wrapper class, arrays
3. Assignments on developing interfaces- multiple inheritance, extending interfaces
4. Assignments on creating and accessing packages
5. Assignments on multithreaded programming

6. Assignments on applet programming

Note: Use Java for programming

Preferably download "[java_ee_sdk-6u4-jdk7-windows.exe](http://www.oracle.com/technetwork/java/javase/downloads/java-ee-sdk-6u4-jdk7-windows.exe)" from

<http://www.oracle.com/technetwork/java/javase/downloads/java-ee-sdk-6u3-jdk-7u1-downloads-523391.html>

Paper Name: Visual Programming Lab

Paper Code:IT495

Contacts: 3P

Credits:2

Introduction to Visual Basic & difference with BASIC.

Concept about form Project, Application, Tools, Toolbox,

i. Controls & Properties. Idea about Labels, Buttons, Text Boxes.

ii. Data basics, Different type variables & their use in VB,

iii. Sub-functions & Procedure details, Input box () & MsgBox ().

iv. Making decisions, looping

v. List boxes & Data lists, List Box control, Combo Boxes, data Arrays.

vi. Frames, buttons, check boxes, timer control,

vii. Programming with data, ODBC data base connectivity.

viii. Data form Wizard, query, and menus in VB Applications,

ix. Graphics.

9. Case studies using any of the following items including relevant form design with the help of visual programming aids.

a) Payroll accounting system.

b) Library circulation management system.

c) Inventory control system.

d) University examination & grading system.

e) Patient information system.

f) Tourist information system.

g) Judiciary information system.

h) Flight reservation system.

i) Bookshop automation software.

j) Time management software.

Paper Name : Technical Report Writing & Language laboratory practice

Paper code: HU481

Contact: 11+2p

Credit : 2

Guidelines for Course Execution:

Objectives of this Course: This course has been designed:

1. To inculcate a sense of confidence in the students.

2. To help them become good communicators both socially and professionally.

3. To assist them to enhance their power of Technical Communication.

Detailed Course Outlines:

A. *Technical Report Writing* : 2L+6P

1. Report Types (Organizational / Commercial / Business / Project)
2. Report Format & Organization of Writing Materials
3. Report Writing (Practice Sessions & Workshops)

B. *Language Laboratory Practice*

I. Introductory Lecture to help the students get a clear idea of Technical Communication & the need of Language Laboratory Practice Sessions :2L

2. Conversation Practice Sessions: (To be done as real life interactions) 2L+4P

a) Training the students by using Language Lab Device/Recommended Texts/cassettes /cd's to get their Listening Skill & Speaking Skill honed

b) Introducing Role Play & honing over all Communicative Competence

3. Group Discussion Sessions: 2L+6P

a) Teaching Strategies of Group Discussion

b) Introducing Different Models & Topics of Group Discussion

c) Exploring Live /Recorded GD Sessions for mending students' attitude/approach & for taking remedial measure Interview Sessions; 2L+6P

a) Training students to face Job Interviews confidently and successfully

b) Arranging Mock Interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in a formal situation for effective communication

4. Presentation: 2L+6P

a) Teaching Presentation as a skill

b) Strategies and Standard Practices of Individual /Group Presentation

c) Media & Means of Presentation: OHP/POWER POINT/ Other Audio-Visual Aids

5. Competitive Examination: 2L+2P

a) Making the students aware of Provincial /National/International Competitive Examinations

b) Strategies/Tactics for success in Competitive Examinations

c) SWOT Analysis and its Application in fixing Target

Books – Recommended:

Nira Konar: English Language Laboratory: A Comprehensive Manual
PHI Learning, 2011

D. Sudharani: Advanced Manual for Communication Laboratories &
Technical Report Writing, Pearson Education (W.B. edition), 2011

References:

Adrian Duff et. al. (ed.): Cambridge Skills for Fluency

A) Speaking (Levels 1-4 Audio Cassettes/Handbooks)

B) Listening (Levels 1-4 Audio Cassettes/Handbooks)

Cambridge University Press 1998

Mark Hancock: English Pronunciation in Use

4 Audio Cassettes/CD'S OUP 2004

Course Structure and Syllabus for Under Graduate Programme
Department of Information Technology, JIS College of Engineering
(An Autonomous Institution)

B. Tech in Information Technology

3rd Year - Semester 5

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
IT501	Data Communication and Networking (Networking I)	3	1	0	4	30	70	100
IT502	Microprocessor & Microcontroller	3	1	0	4	30	70	100
IT503	Database Management System- II	3	1	0	4	30	70	100
IT504	Software Engineering & Project Management	3		0	3	30	70	100
IT505	A. Artificial Intelligence B. Operation Research & Optimization Techniques C. Computer Graphics D. Object Oriented Programming with C++	3	1	0	4	30	70	100
IT591	Data Communication & Networking/Networking I Lab	0	0	3	2	40	60	100
IT592	Microprocessor & Microcontroller Lab	0	0	3	2	40	60	100
IT593	Database Management System- II Lab	0	0	3	2	40	60	100
IT 594	Software Engineering & Project Management Lab	0	0	3	2	40	60	100
IT595	A. Artificial Intelligence Lab B. Operation Research & Optimization Techniques Lab C. Computer Graphics Lab D. Object Oriented Programming with C++ Lab	0	0	3	2	40	60	100
	Total	15	4	15	29	350	650	1000
MC581	Project and Technical Report Writing and Presentation on Industrial Training-I (2 weeks duration)	0	0	0	Mandatory course			
MC582	General Proficiency-I (General aptitude, Technical Communication & Soft Skill)	0	0	3	Mandatory course			
MC583	Professional Certification Program I	0	0	0	Mandatory course			

B. Tech in Information Technology
3rd Year - Semester 5

Paper Name: Data Communication and Networking (Networking I)

Paper Code: IT 501

Contacts:3L+1T

Credit:4

Overview of Data Communication and Networking: [4L]

Introduction; Data communications: components, data representation (ASCII,ISO etc.), direction of data flow (simplex, half duplex, full duplex); network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN,WAN); Internet: brief history, Protocols and standards; Reference models: OSI and TCP/IP.

Physical Level: [6L]

Overview of data (analog & digital), signal(analog & digital), transmission (analog & digital) & transmission media (guided & unguided); Circuit switching: time division & space division switch, TDM bus; Telephone Network;

Data link Layer: [9L]

Types of errors, framing, error detection & correction methods; Flow control; Protocols: Stop & wait ARQ, Go-Back- N ARQ, Selective repeat ARQ, HDLC; Point to Point Protocol, LCP, NCP, Token Ring; Reservation, Polling, Multiple access protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, CSMA/CA Traditional Ethernet, fast Ethernet;

Network layer: [8L]

Internetworking & devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing : IP addressing, subnetting; Routing : techniques, Routing Protocols, ARP, IP, ICMP, IPV6;.

Transport layer: [7L]

Process to Process delivery; UDP; TCP; Congestion Control: Open Loop, Closed Loop choke packets; Quality of service: techniques to improve QoS: Leaky bucket algorithm, Token bucket algorithm,

Application Layer [6L]

Introduction to DNS, SMTP, SNMP, FTP, HTTPS, Firewalls.

Suggested Text / Reference Books:

1. B. A. Forouzan – “Data Communications and Networking (3rd Ed.) “ – TMH
2. A. S. Tanenbaum – “Computer Networks (4th Ed.)” – Pearson Education/PHI
3. W. Stallings – “Data and Computer Communications (5th Ed.)” – PHI/ Pearson Education
4. Zheng & Akhtar, Network for Computer Scientists & Engineers, OUP
5. Black, Data & Computer Communication, PHI

Paper Name: Microprocessor & Microcontroller

Paper Code: IT 502

Contacts:3L+1T

Credit:4

Module -1:	[8L]
Introduction to Microcomputer based system. History of evolution of Microprocessor and Microcontrollers and their advantages and disadvantages.	[1L]
Architecture of 8085 Microprocessor, Pin description of 8085.	[2L]
Address/data bus Demultiplexing , Status Signals and the control signals.	[1L]
Instruction set of 8085 microprocessor, Addressing modes,	[3L]
Timing diagram of the instructions (a few examples).	[1L]

Module -2:	[9L]
Assembly language programming with examples, Counter and Time Delays, Stack and Subroutine Interrupts of 8085 processor (software and hardware), I/O Device Interfacing-I/O Mapped I/O and Memory Mapped I/O , Serial (using SID and SOD pins and RIM, SIM Instructions) and Parallel data transfer,	[6L] [3L]

Module 3:	[10L]
The 8086 microprocessor- Architecture, Addressing modes, Interrupts	[3L]
Introduction to 8051 Microcontroller –Architecture, Pin Details	[3L]
Addressing modes, Instruction set, Examples of Simple Assembly Language.	[4L]

Module -4:	[9L]
Memory interfacing with 8085, 8086	[2L]
Support IC chips- 8255 ,8251,8237/8257,8259	[4L]
Interfacing of 8255 PPI with 8085 and Microcontroller 8051.	[2L]
Brief introduction to PIC microcontroller (16F877)	[1L]

Suggested Text / Reference Books:

1. Fundamentals of microprocessor and microcontroller- B.Ram
2. The 8051 Microcontroller and Embedded System- Mazidi
3. Microprocessor Architecture, Programming and Applications with the 8085- Ramesh s Gaonkar

Paper Name: Database Management System- II

Paper Code: IT 503

Contacts:3L+1T

Credit:4

Unit I Transactions :

Transaction concept, Transaction state, Implementation of atomicity and durability, Concurrent executions, Serializability, Recoverability, Implementation of isolation, Testing for serializability.
(4 Hours)

Concurrency Control : Lock-based protocols, Timestamp-based protocols, Validation-based protocols, Multiple granularity, Multiversion schemes, Deadlock handling, Insert and delete operations, Weak levels of consistency, Concurrency in index structures (6 Hours)

Unit II

Recovery System : Failure classification, Storage structure, Recovery and atomicity, Log-based recovery, Recovery with concurrent transactions, Buffer management, Failure with loss of nonvolatile storage, Advanced recovery techniques, Remote backup systems. (4 Hours)

Unit III

Database-System Architectures :

Centralized and client–server architectures, Server system architectures, Parallel systems, Distributed systems, Network types. (4 Hours)

Parallel Databases :

Parallel databases, I/O parallelism, Interquery parallelism, Intraquery parallelism, Intraoperation parallelism, Interoperation parallelism, Design of parallel systems. (4 Hours)

Unit IV

Distributed Databases:

Homogeneous and heterogeneous databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control in distributed databases, Availability, Distributed query processing, Heterogeneous distributed databases, Directory systems. (5 Hours)

Object-Based Databases:

Overview of object-based databases, Complex data types, Structured types and inheritance in SQL, Table inheritance, Array and multiset types in SQL, Introduction of object-identity and reference types in SQL, Object-oriented versus object-relational. (5 Hours)

Unit V

Advanced Application Development :

Performance tuning, Performance benchmarks, Standardization, Application migration. (1 Hours)

Advanced Data Types & New Applications

Motivation, Time in databases, Spatial and geographic data, Multimedia databases, Mobility and personal databases, Temporal database. (3 Hours)

Advanced Transaction Processing

Transaction-processing Monitors, Transactional workflows, E-Commerce, Main-memory databases, Real-time transaction systems, Long-duration transactions, Transaction management in multidatabases (5 Hours)

Unit VI

XML :

Motivation, Structure of XML data, XML document schema, Querying and transformation, Application program interfaces to XML, Storage of XML data, XML applications, UML. (5 Hours)

Suggested Text / Reference Books:

1. Henry F. Korth and Silberschatz Abraham, “Database System Concepts”, Mc.Graw Hill.
2. Elmasri Ramez and Novathe Shamkant, “Fundamentals of Database Systems”, Benjamin Cummings Publishing. Company.
- 3.H.B.Singh- Database Management System

Paper Name: Software Engineering & Project Management

Paper Code: IT 504

Contacts:3L

Credit: 3

Module 1

Introduction

Software, Type of software, Definition of Software Engineering, Aim and Objective. 1L

Module 2

Software Development Life-cycle

2L

Feasibility Study, Requirements gathering and analysis, SDLC, steps involve in SDLC, maintenance, Role of metrics and measurement.

Module 3

Software Development Life-Cycle Model

5L

Waterfall model, prototyping, iterative enhancement model, evolutionary model incremental model, spiral model. Implementation level and Comparative study of different model

Module 4

5L

Software Requirement Specification

Problem analysis, formal specification, requirement specification, validation, metrics.

Module 5

4L

System Design

Design, Problem partitioning, abstraction, top-down and bottom-up design, Structured approach.

Functional versus object-oriented approach, design specification and verification metrics, monitoring and control, Cohesion and Coupling.

Module 6

Coding

4L

Introduction to Coding Standard and Specification, Top-down and bottom-up approaches, structured programming, information hiding, programming style, and internal documentation. Verification, Metrics,

Module 8

Testing

8L

Test plane, test cases specification, Levels of testing functional testing, structural testing, and reliability assessment. Error handling.

Module 9

8L

Software Project Management and maintenance

Cost estimation, Project scheduling, Staffing, Software configuration management, Quality assurance, Project Monitoring control, Risk management.

Module10

CASE Tool concept, UML: Different types of diagram and chart concept

5L

Suggested Text / Reference Books:

1. Software Engineering - Rajib Mal
2. Software Engineering- Pressman (Pearson Ed.)
3. Software Engineering – Jawadekar (MGH)

Paper Name: Artificial Intelligence

Paper Code: IT 505 A

Contacts:3L+1T

Credit:4

UNIT I – INTRODUCTION

8L

Intelligent Agents- Agents and environments-Good behavior- The nature of environments-structure of agents-Problem Solving agents-example problems-Searching for solutions- uninformed search strategies-avoiding repeated states- searching with partial information.

UNIT II – SEARCHING TECHNIQUES

10L

Informed search and exploration- Informed search strategies- heuristic function-Local search algorithms and optimistic problems- local search in continuous spaces-online search agents and unknown environments-constraint satisfaction problems (CSP)-Backtracking search and Local search for CSP-structure of problems-Adversarial search- Games-Optimal decisions in games-Alpha-Beta pruning-imperfect real-time decision- games that include and element of chance.

UNIT III – KNOWLEDGE REPRESENTATION

10L

First order logic-representation revisited-Syntax and semantics for first order logic-using first order logic-Knowledge engineering in first order logic-inference in first order logic-prepositional versus first order logic-unification and lifting-forward chaining-backward chaining-resolution-knowledge representation-ontological engineering-categories and objects-actions-simulation and events-mental events and mental objects.

UNIT IV – LEARNING

9L

Learning from observations-forms of learning- Inductive learning-Learning decision trees-ensemble learning-knowledge in learning-logical formulation of learning-explanation based learning-learning using relevant information-inductive logic programming-statistical learning methods-learning with complete data-learning with hidden variable-EM algorithm- Instance based learning-Neural networks-Reinforcement learning-Passive reinforcement learning-Active reinforcement learning-Generalization in reinforcement learning.

UNIT V – APPLICATIONS

8L

Communication-communication as action-formal grammar for a fragment of English-Syntactic analysis-Augmented grammars-Semantic interpretation-Ambiguity and disambiguation-Discourse understanding-Grammar induction-Probabilistic language processing- Probabilistic language models-Information retrieval-Information extraction-Machine translation.

Suggested Text / Reference Books:

1. Stewart Russell and Peter Norvig. " Artificial Intelligence-A Modern Approach ", Pearson Education.
2. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd.,
3. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw-Hill,
4. George F. Luger, "Artificial Intelligence-Structures And Strategies For Complex Problem Solving", Pearson Education

Paper Name: Operation Research & Optimization Techniques**Paper Code: IT 505 B****Contacts:3L+1T****Credit:4****Module I****Linear Programming Problems (LPP):** Basic LPP and Applications; Various Components of LP Problem Formulation.**Solution of Linear Programming Problems:** Solution of LPP: Using Simultaneous Equations and Graphical Method; Definitions: Feasible Solution, Basic and non-basic Variables, Basic Feasible Solution, Degenerate and Non-degenerate Solution, Convex set and explanation with examples. [5L]
Solution of LPP by Simplex Method; Charnes' Big-M Method; Duality Theory. Transportation Problems and Assignment Problems. [12L]**Module II****Network Analysis:** Shortest Path: Floyd Algorithm; Maximal Flow Problem (Ford-Fulkerson); PERT-CPM (Cost Analysis, Crashing, Resource Allocation excluded). [6L]**Inventory Control:** Introduction to EOQ Models of Deterministic and Probabilistic ; Safety Stock; Buffer Stock.[3L]**Module III****Game Theory:**Introduction; 2-Person Zero-sum Game; Saddle Point; Mini-Max and Maxi-Min Theorems (statement only) and problems;Games without Saddle Point; Graphical Method; Principle of Dominance.[5L]**Module IV****Queuing Theory:**Introduction; Basic Definitions and Notations; Axiomatic Derivation of the Arrival & Departure (Poisson Queue). Poisson Queue Models: (M/M/1): (∞ / FIFO) and (M/M/1: N / FIFO) and problems.[5L]**Suggested Text / Reference Books:**

1. H. A. Taha, "Operations Research", Pearson
2. P. M. Karak – "Linear Programming and Theory of Games", ABS Publishing House
3. Ghosh and Chakraborty, "Linear Programming and Theory of Games", Central Book Agency
4. Ravindran, Philips and Solberg - "Operations Research", WILEY INDIA
5. Kanti Swaroop — "Operations Research", Sultan Chand & Sons
6. Rathindra P. Sen—"Operations Research: Algorithms and Applications", PHI

Paper Name: Computer Graphics

Paper Code: IT 505 C

Contacts:3L+1T

Credit:4

Module I:[14L]

Introduction to computer graphics & graphics systems [6L]: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations; Visualization & image processing; RGB color model, direct coding, lookup table; storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc.; Active & Passive graphics devices; Computer graphics software.

Scan conversion [8L]: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Module II:[20L]

2D transformation & viewing [15L]: Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to view port co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse. Cohen and Sutherland line clipping, Sutherland-Hodgeman Polygon clipping, Cyrus-beck clipping method

3D transformation & viewing [5L]: 3D transformations: translation, rotation, scaling & other transformations. Rotation about an arbitrary axis in space, reflection through an arbitrary plane; general parallel projection transformation; clipping, view port clipping, 3D viewing.

Module III: [11L]

Curves [3L]: Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves.

Hidden surfaces [3L]: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Painter's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal - geometry.

Color & shading models [2L]: Light & color model; interpolative shading model; Texture.

Introduction to Ray-tracing: [3L]: Human vision and color, Lighting, Reflection and transmission models.

Suggested Text / Reference Books:

1. Hearn & Baker – “Computer Graphics (C version 2nd Ed.)” – Pearson education
2. Z. Xiang, R. Plastock – “Schaum's outlines Computer Graphics (2nd Ed.)” – TMH
3. D. F. Rogers, J. A. Adams – “Mathematical Elements for Computer Graphics (2nd Ed.)” – TMH

Paper Name: Object Oriented Programming with C++

Paper Code: IT 505 D

Contacts:3L+1T

Credit:4

Introduction [3L]

Programming paradigms, Language translator, Basics of OOP, Structure of C++ program, Class and object, Abstraction and encapsulation, Polymorphism, Inheritance, Static and dynamic binding.

Declaration, Expression and statements [4L]

Data types, Variables, Constants, Operator and expression, Operator precedence and associativity. Statements: Labelled, Expression, Compound, Control, Jump, Declaration, Try-throw-catch.

Array, pointer and function [4L]

Array, Addresses, Pointer. Function: Declaration, Definition and call, Inline function, Main function argument, Reference variable, Function overloading, Default argument, Parameter passing, Recursion, Scope of variable, Return-by-value and Return-by-reference, Pointer to function

Data abstraction through classes and user defined data types [6L]

Class, Members, Constructor and destructor, Copy constructor.

Dynamic memory management: Operators new and delete, Malloc and free, Static member, Scope of class names, Scope of variables.

Operator Overloading [5L]

Overloading unary and binary operator, Overloaded function calls, Subscripting, class member access, Non-member operator, New and delete, Cast operator.

Class relationships [6L]

Introduction, Polymorphism, Coercion, Overloading, Parametric and inclusion polymorphism

Inheritance: direct and indirect superclasses, Multiple inheritance, Virtual base class, Friend, Virtual function, Abstract class, Overriding and hiding, Dynamic binding of functions, Virtual destructor and operators.

Template and Exception Handling [5L]

Class template, Member function inclusion, Function template, Specialization, Inheritance, Namespace.

Concept of exception handling, Catch block, Nested try-catch block, Condition expression in throw expression, Constructor & destructor, Runtime standard exception

Standard Library in C++ [3L]

Standard library function, Input and output, Iostream class hierarchy, Class ios, Other stream classes.

Object oriented design and modelling [4L]

Software development, Qualities of software system, Software architecture, Process life cycle, phases, Modularity, OO methodology, Modeling, UML overview, Object oriented design patterns.

Suggested Text / Reference Books:

1. Objected Oriented Programming with C++- E. Balaguruswamy
2. Schildt, H., The Complete Reference C++, McGraw – Hill.
3. C++ object oriented programming paradigm, Debasish Jana, PHI
4. Pooley, R and P. Stevens, Using UML , Addison-Wesley.
5. Programming In C++, Y.I. Shah and M.H. Thaker, ISTE/EXCEL BOOKS
6. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India
7. Rajaram: Object Oriented Programming and C++, New Age International

Paper Name: Computer Networking Lab

Paper Code: IT591

Contacts : 3P

Credits: 2

NIC Installation & Configuration (Windows/Linux)

Understanding IP address, subnet etc

Familiarization with

- Networking cables (CAT5, UTP)
- Connectors (RJ45, T-connector) Hubs, Switches
- TCP/UDP Socket Programming
- Simple, TCP based, UDP based Multicast & Broadcast Sockets

Implementation of a Prototype Multithreaded Server

Implementation of Data Link Layer Flow Control Mechanism (Stop & Wait, Sliding Window), Data

Link Layer Error Detection Mechanism (Cyclic Redundancy Check), Data Link Layer Error Control

mechanism (Selective Repeat, Go Back N)

Server Setup/Configuration

FTP, TelNet, NFS, DNS, Firewall.

Socket programming

Paper Name: Microprocessor & Microcontroller Lab

Paper Code: IT592

Contacts : 3P

Credits: 2

Sl	Content	Hours
1	Study of Prewritten programs on 8085 trainer kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical). Or, Familiarization with 8085 simulator on PC. Programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical) on the simulator.	3
2	Programming using kit or Simulator for: 1. Table look up 2. Copying a block of memory 3. Shifting a block of memory iv) Packing and unpacking of BCD numbers 4. Addition of BCD numbers	18

	5. Binary to ASCII conversion and vice-versa (Using Subroutine Call) 6. BCD to Binary Conversion and vice-versa vii) String Matching, Multiplication	
3	Program using IN/OUT instructions and 8255 PPI on the trainer kit e.g. subroutine for delay, 1. Glowing all the LEDs one by one with particular delay 2. Reading switch state and glowing LEDs accordingly.	3
4	Serial communication between two trainer kits	3
5	Study of Prewritten programs on 8051 Microcontroller Kit using the basic instruction set (data transfer, Load/Store, Arithmetic, Logical). Or, Familiarization with 8051 Simulator on PC. Study of prewritten programs using basic instruction set (data transfer, Load/Store, Arithmetic, Logical).	3
Total 30 hours (10 classes each of 3 periods)		

Paper Name: Database Management System- II Lab

Paper Code: IT593

Contacts : 3P

Credits: 2

1. Study of Backend Tool – Oracle.
2. Data Definition Language (DDL) commands in RDBMS.
3. Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.
4. High-level language extension with Cursors.
5. High level language extension with Triggers
6. Procedures and Functions.
7. Embedded SQL.
8. Database design using E-R model and Normalization.
9. Mini project (Application Development using Oracle and Visual Basic)
 - i. Inventory Control System.
 - ii. Material Requirement Processing
 - iii. Hospital Management System
 - iv. Railway Reservation System
 - v. Personal Information System
 - vi. Web Based User Identification System
 - vii. Time-table Management System

Suggested Text / Reference Books:

1. Oracle 10g complete reference
2. PL/SQL

Paper Name: Software Engineering & Project Management Lab

Paper Code: IT594

Contacts : 3P

Credits: 2

1. Preparation of requirement document for proposed project in standard format.
2. Project Schedule preparation using tools like MSProject. Generation of Gantt and PERT chart from schedule. Prepare Project Management Plan in standard format.
3. Draw Use Case diagram, Class diagram, Sequence diagram and prepare Software Design Document using tools like Rational Rose.
4. Estimate project size using Function Point(FP)/Use Case Point. Use Excel/Open Office template for calculation.
5. Design Test Script/Test Plan(both Black box and WhiteBox approach) for a small component of the proposed project.(Develop that component using programming languages like c/Java/VB etc.)
6. Generate Test Result and perform defect root cause analysis using Pareto or Fishbone diagram.
7. Compute Process and Product Metrics (e.g Defect Density, Defect Age, Productivity, Cost etc.)
8. Familiarization with any Version Control System like CVS/VSS/Pvcs etc.

(Following projects can be used as dummy projects:

Library Management System

Railway Reservation System

Employee Payroll

Online Banking System

Online Shopping Cart

Online Examination)

Paper Name: Artificial Intelligence Lab

Paper Code: IT595A

Contacts : 3P

Credits: 2

Sl. No.	Topics
1	Preamble: Introduction to fact base programming, Prolog, SWI-Prolog as tool, Download and Install
2	Facts: Simple facts and facts with arguments
3	Variables & Unifications Simple Unification Variable Unifications
4	Rules Simple Predicates, How to add a rule with program
5	Back tracking Fail, Cut, Not
6	Recursion

	Family tree, Factorial
7	Input & Output Read and Write
8	Operators and Arithmetic
9	Graph Traversal Depth First Search, Breadth First Search

Paper Name: Operation Research & Optimization Techniques Lab

Paper Code: IT595B

Contacts : 3P

Credits: 2

Software based Lab using C /C++

1. Assignment on Transportation problem.
2. Assignment on Assignment problem
3. Assignment on Duality
4. Assignment on Simplex method (Including Charns' Big-M Method)
5. Assignment on Shortest Path by using Dijkstra's or Floyd's Algorithm
6. Assignment on Maximal Flow Problem (Ford-Fulkerson Method).
7. Assignment on PERT/CPM
8. Familiarization with O.R package: TORA

Paper Name: Computer Graphics Lab

Paper Code: IT595C

Contacts : 3P

Credits: 2

1. Implementation of Bresenham's Algorithm – Line, Circle, Ellipse.
2. Implementation of Line, Circle and ellipse Attributes.
3. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
4. Composite 2D Transformations.
5. Cohen Sutherland 2D line clipping and Windowing
6. Sutherland – Hodgeman Polygon clipping Algorithm.
7. Three dimensional transformations - Translation, Rotation, Scaling.
8. Composite 3D transformations.
9. Drawing three dimensional objects and Scenes.
10. Generating Fractal images.

Paper Name: Object Oriented Programming with C++ Lab

Paper Code: IT595D

Contacts : 3P

Credits: 2

Introduction of UNIX/Linux Operating System which includes preliminary commands, start-up & shutdown methodology, file handling as well as introduction to editors like Vi editor, introduction to GNU C & C++ compiler, as well as introduction to GNU & GDB script. **[4P]**

Introduction to C++, basic loop control, executing programs, writing functions, selection statements, review of functions and parameters, command line arguments, recursion, I/O streams, arrays and string manipulation, pointers, structures & unions. **[6P]**

Object-Oriented Programming in C++, fundamentals of classes, constructors-destructors. Dealing with member functions, operator overloading and polymorphism (both static & dynamic). **[6P]**

Dealing with inheritance, derived class handling, abstract class, virtual class, overriding, template class, name-space & exception handling. **[4P]**

Dynamic memory allocation, implementation of Linked Lists, using C++. **[4P]**

Course Structure and Syllabus for Under Graduate Programme
Department of Information Technology, JIS College of Engineering
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B. Tech in Information Technology

3rd Year - Semester 6

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
IT601	System Software & Network Administration (Networking II)	3	1	0	4	30	70	100
IT602	Web Technology(Advance Java & J2EE)	3	1	0	4	30	70	100
IT603	Soft Computing	3	0	0	3	30	70	100
IT604	Multimedia Technology	3	0	0	3	30	70	100
IT605	A. Design Analysis of Algorithm B. Digital Image Processing C. Advanced Operating System	3	1	0	4	30	70	100
IT691	System Software & Network Administration Lab/Networking II Lab	0	0	3	2	40	60	100
IT692	Web Technology lab (Advance Java & J2EE Lab)	0	0	3	2	40	60	100
IT693	Soft Computing Lab	0	0	3	2	40	60	100
IT694	Multimedia Technology Lab	0	0	3	2	40	60	100
HU691	Foreign Language Lab(Japanese/French/German/Spanish)	0	0	3	2	40	60	100
	Total	15	3	15	28	350	650	1000
MC681	Project ,Technical Report Writing and Presentation on Industrial Training-II (2 weeks duration)	0	0	0	Mandatory course			
MC682	General Proficiency-II (General aptitude, Technical Communication & Soft Skill)	0	0	3	Mandatory course			
MC683	Professional Certification Program II	0	0	0	Mandatory course			

B. Tech in Information Technology
3rd Year - Semester 6

Paper Name: System Software & Network Administration (Networking II)

Paper Code: IT601

Contacts: 3L

Credits: 4

Introduction [4L]

Duties of the Administrator, Administration tools, Overview of permissions. Processes: Process status, Killing processes, process priority. Starting up and Shut down: Peripherals, Kernel loading, Console, The scheduler, init and the init tab file, Run-levels, Run level scripts.

Managing User Accounts: [3L]

Principles, password file, Password security, Shadow file, Groups and the group file, Shells, restricted shells, user management commands, homes and permissions, default files, profiles, locking accounts, setting passwords, Switching user, Switching group, Removing users.

Managing Unix File Systems: [3L]

Partitions, Swap space, Device files, Raw and Block files, Formatting disks, Making file systems, Superblock, I-nodes, File system checker, Mounting file systems, Logical Volumes, Network File systems, Boot disks.

Configuring the TCP/IP Networking : [5L]

Kernel Configuration; Mounting the /proc File system, Installing the Binaries, Setting the Hostname, Assigning IP Addresses, Creating Subnets, Writing hosts and networks Files, Interface Configuration for IP, ifconfig, netstat command, Checking the ARP Tables; Name service and resolver configuration.

TCP/IP Firewall :[7L]

Methods of Attack, Firewall, IP Filtering. Setting Up Linux for Firewalling Testing a Firewall Configuration; A Sample Firewall Configuration: IP Accounting, Configuring the Kernel for IP Accounting, Configuring IP Accounting, Using IP Accounting Results.

IP Masquerade and Network Address Translation : [5L]

Side Effects and Fringe Benefits, Configuring the Kernel for IP Masquerade, Configuring IP Masquerade

The Network Information System : [4L]

Getting Acquainted with NIS, NIS Versus NIS+ , The Client Side of NIS, Running an NIS Server, NIS Server Security.

Network file system: [4L]

Preparing NFS, Mounting an NFS Volume, The NFS Daemons, The exports File.

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System Backup & Recovery: [4L]

Log files for system and applications; Backup schedules and methods (manual and automated).

Suggested Text / Reference Books:

Books

1. L.L. Beck – “System Software “ (3rd Ed.)- Pearson Education

References

2. Michel Ticher – “PC System Programming”, Abacus.
3. Kirch – “Linux network Administrator’s guide (2nd Ed.)” – O’Rielly
4. Maxwell – “Unix system administration” - TMH
5. Limoncelli – “The Practice of System & Network Administration”-Pearson
6. Wells, LINUX Installation & Administration, Vikas

Paper Name: Web Technology(Advance Java & J2EE)

Paper Code: IT602

Contacts: 3L

Credits: 4

Introduction to World Wide Web [1L]:

Web Architecture, Web Applications, Web servers, Web Browsers and Agents, Internet standards, DNS, SMTP etc.

Classification of Web Protocols [1L]:

Pull and Push mechanism: Pros and Cons. HTTP, HTTPS, XMPP

Mark-up [2L]: HTML 4.x: Elements, Attributes, Tags, Forms, Input, Frames, Tables.

Cascading Style Sheets [1L]: Advantages, Rules, CSS, inline and external, using template Layouts,

JavaScript and DHTML [4L]: Language basics: variables, control statements, inbuilt objects. Achieving interactive static web page with Java script: validation of user input, disabling event propagation stack, manipulation of DOM hierarchy, event bubbling, Fancying with multiple windows and DOM.

Non-Browser Web Agents [2L]: Limitation of Applets: Security Policy, Signing an Applet, HTTP Tunneling, Programmatically issuing HTTP GET, POST etc. and retrieval of content

Server-side Programming [6L]: Servlets: Concept of Dynamic Web pages, Web server versus Application server, Role of threading in a Server, Servlet-2.x API conforming to Web 2.0: Role of *web.xml* as deployment descriptor, request and response, Basic request handling, parameter retrieval, multiple parameter retrieval, inter-Servlet collaboration: Dispatching the request, Concept of state of web: Sessions , tracking session, Using Cookies and *jsessionId*, Parameter passing to and from session,

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Servlet Filters and common uses of Filters and Cookies. Migration to Servlet 3.x plus and omission of web.xml and concept of WebSocket.

Persistence: JDBC 3.x framework [4L]: Need and different approaches of persistence of data, Connecting to databases using *jdbc:odbc* bridge and Type-4 drivers, Executing basic CRUD using JDBC: *Statement, PreparedStatement, ResultSet*.

Execution of batch SQL, Stored Procedures using *CallableStatement*, Transaction Failure management: Save Point and roll back concepts, Prevention of *SQL injection*, Concept of connection URL in details: Connecting to a remote database host (server). Concept of roles of Drivers: Java reflection in Action.

Java Server Pages [7L]: Benefits of JSP over Servlets, JSP scriptlets, page directives, declarations, action tags: `<jsp:useBean/>`, `<jsp:include/>` `<jsp:forward/>`, introducing **MVC architecture** and its different patterns. **Introduction to Struts**

XML Technologies [2L]: XML, Namespace, DTD, W3C XML Schema

Ajax [2L]: Introduction to Asynchronous pattern and Using XML to communicate over XMLHttpRequest object. Handling 5 states and finding response state. Migration of Ajax to AJAX

Overview of EJB 2.x [7L]: Need of EJB, Session Beans: Stateless & Stateful, Entity Beans *CMP, BMP*, Message Driven Beans.

Suggested Text / Reference Books:

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.
2. Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Kogent Learning Solutions INC.

Paper Name: Soft Computing

Paper Code: IT603

Contacts: 3L

Credits: 3

INTRODUCTION TO SOFT COMPUTING AND NEURAL NETWORKS

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence - Machine Learning Basics

GENETIC ALGORITHMS

9L

Introduction to Genetic Algorithms (GA) – Applications of GA in Machine Learning – Machine Learning Approach to Knowledge Acquisition.

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NEURAL NETWORKS

11L

Machine Learning Using Neural Network, Adaptive Networks – Feed forward Networks – Supervised Learning Neural Networks – Radial Basis Function Networks - Reinforcement Learning – Unsupervised Learning Neural Networks – Adaptive Resonance architectures – Advances in Neural networks.

FUZZY LOGIC

11L

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations – Membership Functions- Fuzzy Rules and Fuzzy Reasoning – Fuzzy Inference Systems – Fuzzy Expert Systems – Fuzzy Decision Making

NEURO-FUZZY MODELING

4L

Adaptive Neuro-Fuzzy Inference Systems – Coactive Neuro-Fuzzy Modeling – Classification and Regression Trees – Data Clustering Algorithms – Rulebase Structure Identification – Neuro-Fuzzy Control – Case studies

Hybrid Systems

4L

Hybrid systems, GA based BPNN (Weight determination, Application); Neuro Fuzzy Systems—Fuzzy BPNN--fuzzy Neuron, architecture, learning, application; Fuzzy Logic controlled GA;

Suggested Text / Reference Books:

Textbooks:

1. Neural Networks- A Comprehensive foundation, Simon Haykin, 2nd Ed; Pearson
2. Fuzzy Sets & Fuzzy Logic, Klir & Yuan, PHI
3. Genetic Algorithm – Melanie Mitchell, PHI

References:

4. Neural Networks, Fuzzy Logic & Genetic Algorithms – Synthesis & applications, T.S. Rajasekaran & G.A. Vijaylakshmi Pai, PHI
5. Genetic Algorithm & fuzzy Logic Systems - Sanchez, Takanori, Zadeh; World Scientific
6. Genetic Algorithm, Goldberg David E.; Pearson
7. Fuzzy Set Theory & Its Applications - Zimmermann H. J.; Allied Publishers Ltd.
8. Fundamentals of Neural Networks, architectures, algorithms & applications --- Laurence Fausett; Prentice Hall, Englewood Cliffs.

Paper Name: Multimedia Technology

Paper Code: IT604

Contacts: 3L

Credits: 3

Introduction

Multimedia today, Impact of Multimedia, Multimedia Systems, Components and Its Applications

Text and Audio

Text: Types of Text, Ways to Present Text, Aspects of Text Design, Character, Character Set, Codes, Unicode, Encryption; Audio: Basic Sound Concepts, Types of Sound, Digitizing Sound, Computer

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Representation of Sound (Sampling Rate, Sampling Size, Quantization), Audio Formats, Audio tools, MIDI

Image and Video

Image: Formats, Image Color Scheme, Image Enhancement; Video: Analogue and Digital Video, Recording Formats and Standards (JPEG, MPEG, H.261) Transmission of Video Signals, Video Capture, and Computer based Animation.

Synchronization

Temporal relationships, synchronization accuracy specification factors, quality of service

Storage models and Access Techniques

Magnetic media, optical media, file systems (traditional, multimedia) Multimedia devices – Output devices, CD-ROM, DVD, Scanner, CCD

Document Architecture and Content Management

Content Design and Development, General Design Principles

Hypertext: Concept, Open Document Architecture (ODA), Multimedia and Hypermedia Coding Expert Group (MHEG), Standard Generalized Markup Language (SGML), Document Type Definition (DTD), Hypertext Markup Language (HTML) in Web Publishing. Case study of Applications

Multimedia Applications

Interactive television, Video-on-demand, Video Conferencing, Educational Applications, Industrial Applications,

Multimedia archives and digital libraries, media editors

Suggested Text / Reference Books:

Books:

1. Principles of multimedia- Ranjan Parekh

Reference:

2. Ralf Steinmetz and Klara Nahrstedt , Multimedia: Computing, Communications & Applications , Pearson Ed.

3. Nalin K. Sharda , Multimedia Information System , PHI.

4. Fred Halsall , Multimedia Communications , Pearson Ed.

5. Koegel Buford , Multimedia Systems , Pearson Ed.

6. Fred Hoffstetter , Multimedia Literacy , McGraw Hill.

7. Ralf Steinmetz and Klara Nahrstedt , Multimedia Fundamentals: Vol. 1- Media Coding and Content Processing PHI.

Paper Name: Design and Analysis of Algorithm

Paper Code: IT605A

Contracts: 3L

Credits: 4

Basic Tools on Designing Algorithms: 4L

What is an algorithm? Algorithm specification and performance analysis, randomized algorithms.

Divide-and-Conquer: 6L

The general method, application to binary search, finding the maximum and minimum, merge sort, quick sort, the problem of selection and Strassen's matrix multiplication.

The Greedy Method: 6L

The general method, application to optimal storage on tapes, job sequencing with deadlines, optimal merge patterns and minimum weight spanning trees.

Dynamic Programming: 10L

The general method, application to multistage graphs, all pairs shortest paths, optimal binary search trees, 0/1-Knapsack and traveling salesman problem, Flow shop scheduling
Backtracking: The general method, application to 8- puzzle problem, 8- queen problem and sum of subsets.

Branch and Bound: 6L

The method, application to 0/1 Knapsack traveling salesman problems, and efficiency considerations.

NP-Hard and NP-Complete Problems: 8

Introduction and basic concepts, non-deterministic turing machine, the classes of P and NP, NP-hard graph problems, NP-completeness of the satisfiability problem, and polynomial- space-bounded problem.

Suggested Text / Reference Books:

Text Book:

1. E. Horowitz. et.al., Fundamentals of computer Algorithms, Galgotia Publication Pvt. Ltd., New Delhi,

Reference Books:

1. J.Kleinberg & E. Tardos – Algorithm Design, Pearson Education, New Delhi,
2. G.Brassard & P. Bratley – Fundamentals of Algorithms, PHI, New Delhi,
3. T.H. Cormen et.al. – Introduction to Algorithms – PHI, New Delhi,
4. S.Dasgupta et.al. – Algorithms, TMH, New Delhi -

Paper Name: Digital Image Processing

Paper Code: IT605B

Contracts: 3L

Credits: 4

DIGITAL IMAGE FUNDAMENTALS 8L

Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, Mach Band effect, Image sampling, Quantization, Dither, Two dimensional mathematical preliminaries.

IMAGE TRANSFORMS 8L

1D DFT, 2D transforms - DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, SVD, Wavelet transform.

IMAGE ENHANCEMENT AND RESTORATION 8L

Histogram modification, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic and Yp mean filters . Design of 2D FIR filters. Image restoration - degradation model, Unconstrained and Constrained restoration, Inverse filtering-removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations-spatial transformations, Gray Level interpolation

IMAGE SEGMENTATION AND RECOGNITION 8L

Image segmentation - Edge detection, Edge linking and boundary detection, Region growing, Region splitting and Merging, Image Recognition - Patterns and pattern classes, Matching by minimum distance classifier, Matching by correlation. Neural networks-Backpropagation network and training, Neural network to recognize shapes.

IMAGE COMPRESSION 8L

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Block Truncation Coding, Transform coding, JPEG standard, JPEG 2000, EZW, SPIHT, MPEG.

Suggested Text / Reference Books:

TEXT BOOKS

1. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education

REFERENCES

2. William K Pratt, Digital Image Processing John Willey
3. Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy
4. A.K. Jain, PHI, New Delhi -Fundamentals of Digital Image Processing.
5. Chanda Dutta Magundar – Digital Image Processing and Applications, Prentice Hall of India,

Paper Name: Advanced Operating System

Paper Code: IT605C

Contracts: 3L

Credits: 4

Introduction to Distributed System [2L]

Introduction, Examples of distributed system, Resource sharing, Goals of distributed system, hardware and software Concepts, design issues, Challenges.

Operating System Structures: [3L]

Review of structures: monolithic kernel, layered systems, virtual machines. Process based models and client server architecture; The micro-kernel based client-server approach.

Communication [4L]

Inter-process communication, Remote Procedure Call, Remote Object Invocation, Tasks and Threads. Examples from LINUX, Solaris 2 and Windows NT.

Theoretical Foundations: [2L]

Introduction. Inherent Limitations of distributed Systems. Lamport's Logical clock. Global State

Distributed Mutual Exclusion:[4L]

Classification of distributed mutual exclusion algorithm. NonToken based Algorithm:Lamport's algorithm, Ricart-Agrawala algorithm. Token based Algorithm: Suzuki-Kasami's broadcast algorithm.

Distributed Deadlock Detection: [5L]

Deadlock handling strategies in distributed systems. Control organizations for distributed deadlock detection. Centralized and Distributed deadlock detection algorithms: Completely Centralized algorithms, path pushing, edge chasing, global state detection algorithm.

Protection and Security: [4L]

Requirements for protection and security regimes. The access matrix model of protection. System and user modes, rings of protection, access lists, capabilities. User authentication, passwords and signatures. Use of single key and public key encryption.

Distributed file systems: [6L]

Issues in the design of distributed file systems: naming, transparency, update semantics and fault resilience. Use of the Virtual File System layer. Examples of distributed systems including Sun NFS, the Andrew file store, CODA file system and OSF DCE.

Distributed Shared Memory: [4L]

Architecture and motivations. Algorithms for implementing DSM. Memory Coherence

CORBA: [3L]

The Common Object Request Broker Architecture model and software and its relationship to Operating Systems.

Real Time Operating System [4L]

Introduction, Definition and Application, Basic model, Characteristics, Types of real time tasks, Timing Constraints, Modeling Timing Constraints,

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Suggested Text / Reference Books:

TEXTBOOKS:

1. *Distributed Systems: Principles and Paradigms*. Andrew S. Tanenbaum, Maarten Van Steen, Pearson Prentice Hall, 2007.

REFERENCES

2. *Operating Systems Internals and Design Principle*, William Stallings, Prentice Hall Publishers,
3. *Operating Systems Concepts*, A. Silberschatz and P. Galvin, Addison-Wesley
4. *Modern Operating Systems*, Andrew S. Tanenbaum, Prentice Hall or other undergraduate textbook.

Paper Name: System Software & Network Administration Lab/Networking II Lab

Paper Code: IT691

Contracts: 3L

Credits: 2

S.No Experiment

1. Study of different types of Network cables and practically implement the Cross-wired cable and straight through cable using clamping tool.
 1. Study of Network Devices in Detail.
 2. Study of network IP.
 3. Connect the computers in Local Area Network.
 4. Study of basic network command and Network configuration commands.
 5. Configure a Network topology using packet tracer software.
 6. Configure a Network topology using packet tracer software.
 7. Configure a Network using Distance Vector Routing protocol.
 8. Configure Network using Link State Vector Routing protocol

Paper Name: Web Technology Lab (Advance Java & J2EE Lab)

Paper Code: IT692

Contracts: 3L

Credits: 2

1. Assignments involving client side programming using HTML, Java Applet etc.
2. Assignments on programming using scripting languages such as JavaScript
3. Assignments involving server side programming using JSP, Servlet etc.
4. Assignments on Enterprise Application Development using JavaBeans, EJB.
5. Assignments involving SOA & Cloud Computing.

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Suggested Text / Reference Books:

Reference Books:

1. Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI Learning, Delhi, 2013.
2. Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Kogent Learning Solutions INC.

Paper Name: Soft Computing Lab

Paper Code: IT693

Contracts: 3L

Credits: 2

- 1) a) Write a Matlab program (m.file) to calculate union, intersection, complement and difference of two fuzzy sets.
b) Write a Matlab program (m.file) to calculate the Demorgan's Law.
- 2) Find whether the given matrix is (a) reflexive (b) tolerance and (c) transitivity matrix or not.
- 3) Find whether the given matrix is symmetry or not by a Matlab program.
- 4) Find the fuzzy relation between two vectors R and S Using max-product and max-min method by a Matlab program
- 5) (a) Use Matlab command line commands to display the Gaussian membership function. Given $x = 0-10$ with increment of 0.1 and Gaussian function is defined between 0.5 and -5 .
(b) Use Matlab command line commands to display the triangular membership function. Given $x = 0-10$ with increment of 0.2 triangular membership function is defined between [3 4 5]
- 6) Illustrate different types of generalized bell membership functions using Matlab program
- (7) Using Matlab program find the crisp lambda cut set relations for $\lambda = 0.2$, the fuzzy matrix is given by
 $R =$

0.2	0.7	0.8	1
1	0.9	0.5	0.1
0	0.8	1	0.6
0.	0.4	1	0.3
- (8) Temperature control of the reactor where the error and change in error is given to the controller. Here the temperature of the reactor is controlled by the temperature bath around the reactor thus the temperature is controlled by controlling the flow of the coolant into the reactor. Form the membership function and the rule base using FIS editor.
- (9) Consider the water tank with following rules
 1. IF (level is okay) THEN (valve is no_change) (1)
 2. IF (level is low) THEN (valve is open_fast) (1)
 3. IF (level is high) THEN (valve is close_fast) (1)Using Mamdani method and max-min method for fuzzification and method of centroid for defuzzification method construct a FIS. Before editing that rules, membership functions must be defined with membership function editor.
- (10) (a) Form a fuzzy system, which approximates function f , when $x \in [-10, 10]$. Repeat the same by adding random, normally distributed noise with zero mean and unit variance.
(b) Simulate the output when the input is $\sin(t)$. Observe what happens to the signal shape at the output.

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(11) Use Matlab's Fuzzy Logic Toolbox to model the tip given after a dinner for two, where the food can be disgusting, not good, bland, satisfying, good, or delightful, and the service can be poor, average, or good. To get started, you type fuzzy in a Matlab window. Then use the fuzzy inference system and membership function editors to define and tune your rules.

PART B (Neural Network)

12. Design networks of McCulloch-Pitts neurons that implement logical NOT, AND and OR gates. Draw each network and label all the weight and threshold values.

13. Derive expressions for the weights and thresholds of a McCulloch-Pitts neuron that can compute the following input-output mappings:

<i>in1</i>	<i>in2</i>	<i>out</i>
0	0	1
0	1	0
1	0	0
1	1	0

Write Matlab code for the above ANN.

14 Investigation the use of back-propagation learning using a sigmoidal nonlinearity to achieve one-to-one mapping, as described here:

1. $f(x) = 1/x$, $1 \leq x \leq 100$
2. $f(x) = \log_{10}x$, $1 \leq x \leq 10$
3. $f(x) = \exp(-x)$, $1 \leq x \leq 10$
4. $f(x) = \sin x$, $0 \leq x \leq \pi/2$

for each mapping, do the following:

- (a) Set up two sets of data, one for network training, and the other for testing.
- (b) Use the training data set compute the synaptic weights of the network, assumed to have a single hidden layer.
- (c) Evaluate the computation accuracy of the network by using the test data. Use a single layer but with a variable number of hidden neurons. Investigate how the network performance is affected by varying the size of the hidden layer.

Paper Name: Multimedia Technology Lab

Paper Code: IT694

Contracts: 3L

Credits: 2

1. Sound capturing & editing using tools like SOUNDFORGE
2. Image editing using tools like Adobe Photoshop
3. Creating/editing motion video/animation clips (using tools like Flash / Adobe Premier)
4. Creation of Content using HTML (basic tags, table form, frame, link to other Image)
5. Creating stylesheet using DHTML
6. Home Page creation using HTML, DHTML

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Suggested Text / Reference Books

1. Adobe , Adobe Photoshop 6.0: Classroom in a book Pearson Ed.
2. Anushka Wirasinha , Flash in a Flash- Web Development , PHI
3. Macromedia Flash5 fast and easy Web Development, Design, PHI
4. Castro, HTML4 for the World Wide Web, Pearson Ed.
5. Schurman & Purdi , Dynamic HTML in Action, Second Edition , PHI
6. Lozano, Multimedia- Sound & Video , PHI

Paper Name: Foreign Language Lab
(Japanese/French/German/Spanish)

Paper Code: HU691

Contracts: 3L

Credits: 2

Under Constructions

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B. Tech in Information Technology
4th Year - Semester 7

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
IT701	E-Commerce & ERP	3	1	0	4	30	70	100
IT702	Mobile Communication	3	1	0	4	30	70	100
IT703	A. Cloud Computing & SOA B. Computer Vision & Pattern Recognition C. Compiler Design	3	0	0	3	30	70	100
IT704	A. VLSI Design B. Robotics C. Bioinformatics & DNA Computing	3	0	0	3	30	70	100
IT791	E-Commerce & ERP Lab	0	0	3	2	40	60	100
IT792	C# and .NET Framework Lab	0	0	3	2	40	60	100
IT781	Minor Project	0	0	3	4	40	60	100
IT782	Technical Report Writing and Presentation on Industrial Training-III (4 Weeks Duration)	0	0	0	2	0	50	50
HU783	General Proficiency-III (Group discussion ,Soft Skill & Personality Development)	0	0	3	2	0	50	50
	Total	12	2	15	26	240	560	800
MC783	Professional Certification Program III	0	0	0	MANDATORY COURSE			

B. Tech in Information Technology
4th Year - Semester 7

Paper Name: E-Commerce & ERP

Paper Code: IT-701

Contact: 3L+1T

Credit: 4

Introduction to E-Commerce [3L]

Definition, Scope of E-Commerce, Hardware requirements, E-Commerce and Trade Cycle, Electronic Markets, Electronic Data Interchange and Internet Commerce.

Business to Business E-Commerce [7L]

Electronic Markets, Electronic Data Interchange (EDI): Technology, Standards (UN/EDIFACT), Communications, Implementations, Agreements, Security, EDI and Business, Inter-Organizational E-commerce. Business models for E-commerce, Business Process Re-Engineering.

Legal issues [5L]

Risks: Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable online contract.

Security Issues [7L]

Security Solutions: Symmetric and Asymmetric Cryptosystems, RSA, DES, and Digital Signature, Protocols for secure messaging, Secure Electronic Transaction (SET) Protocol, Electronic cash over internet, Internet Security, Search engines, Intelligent agents in E-Commerce Electronic payment systems, E-security, Mobile commerce.

Business to Consumer E-Commerce and E-Business [8L]

Consumer trade transaction, Web metrics, Elements of E-Commerce, Industry impacts of E-business. Integrating Intranet and internet web applications across multiple networks. Internet bookshops, Software supplies and support, Electronic Newspapers, Internet Banking, Virtual Auctions, Online Share Dealing, Gambling on the net, E-Diversity, Case studies through internet.

ERP [9L]

The evolution of ERP systems, Business processes supported by ERP systems, The evolution of ERP systems architecture, Enterprise Perspective, Resource Management Perspective, Information System Perspective, Key Managerial Issues, OLAP, E-SCM and E-CRM.

Suggested Text / Reference Books:

1. E-Commerce-Strategy, Technologies & Applications by David Whitley, TMH
2. Handbook on Electronic Commerce, Shaw et al., Springer publication.

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3. E-Commerce-Strategy, Technologies & Applications by David Whitley, TMH
4. Applied E-Commerce, Langer, John Wiley Publication.
5. E-Commerce- The cutting edge of business by Kamlesh K. Bajaj, TMH
6. Global Electronic Commerce- Theory and Case Studies by J. Christopher Westland and Theodore H. K Clark, University Press.
7. Enterprise Resource Planning – A Managerial Perspective by D P Goyal, Tata McGraw Hill Education, 2011

Paper Name: Mobile Communications

Paper Code: IT 702

Contact: 3L+1T

Credit: 4

A General Overview [2L]: History, Transmission Medium, Need, Advantages, Disadvantages

Introduction to Personal Communications Services (PCS) [5L]: PCS Architecture, Mobility management, Networks signalling. Global System for Mobile Communication (GSM) system overview: GSM Architecture, Mobility management, Network signalling.

General Packet Radio Services (GPRS) [2L]: GPRS Architecture, GPRS Network Nodes.

Wireless LANs [6L]: Characteristics, IEEE 802.11: Architecture, Physical Layer, MAC Layer, And MAC Management, 802.11a and 802.11b. HIPERLAN: History, WATM, BRAN and HiperLAN2.

Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Management Protocol, L2CAP and Security.

Mobile Transport and Network Layer [12L]: Introduction, Traditional TCP: Congestion Control, Slow Start, Fast Retransmit and Implications of Mobility. Classical TCP Improvements: Indirect TCP, SnoopingTCP, Mobile TCP and Fast Retransmit. Mobile IP: Introduction, IP Packet Delivery, Agent Discovery, Registration, Tunneling and Encapsulation, Optimizations and Reverse Tunneling. Mobile Ad-hocNetworks: Routing, Destination Sequence Distance Vector, Dynamic Source Routing and Alternative Metrics.

Cellular Networks [9L]: Cellular Concept, Frequency Reuse, Channel Allocation Management, Call Setup, Location Management, Cell Handoffs, Interference: Co-channel and Adjacent Interference. System Capacity, Improving Cell Capacity and Coverage: Cell Splitting, Sectoring, Repeaters and Microcell ZoneConcept Wireless Application Protocol (WAP) [4L]: The Mobile Internet standard, WAP Gateway and Protocols,

Suggested Text / Reference Books:

Books:

1. J. Schiller, Mobile Communications, Addison –Wesley, 2003
2. T. S. Rapport, Wireless Communications, Principle and Practices
3. Forouzan, Data Communications and Networking, TMH

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Paper Name: Cloud Computing

Paper Code: Code: IT 703A

Contacts: 3L

Credits: 3

Allocated Hrs: 40Hrs

Overview of Computing Paradigm [3L]

Recent trends in Computing Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing Evolution of cloud computing Business driver for adopting cloud computing

Introduction to Cloud Computing[3L]

Cloud Computing (NIST Model) Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers Properties, Characteristics And Disadvantages Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing Role of Open Standards

Cloud Computing Architecture[4L]

Cloud computing stack Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services Service Models (XaaS) Infrastructure as a Service(IaaS) Platform as a Service(PaaS) Software as a Service(SaaS) Deployment Models Public cloud Private cloud Hybrid cloud Community cloud

Infrastructure as a Service(IaaS)[4L]

Introduction to IaaS IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine(VM) Resource Virtualization Server Storage Network Virtual Machine(resource) provisioning and manageability, storage as a service, Data storage in cloud computing(storage as a service) Examples Amazon EC2 Renting, EC2 Compute Unit, Platform and Storage, pricing, customers Eucalyptus

Platform as a Service(PaaS)[3L]

Introduction to PaaS What is PaaS, Service Oriented Architecture (SOA) Cloud Platform and Management Computation Storage Examples Google App Engine Microsoft Azure Salesforce.comTMs Force.com platform

Software as a Service(PaaS)[4L]

Introduction to SaaS Web services Web 2.0 Web OS Case Study on SaaS

Service Management in Cloud Computing[5L]

Service Level Agreements(SLAs) Billing And Accounting Comparing Scaling Hardware: Traditional vs. Cloud Economics of scaling: Benefitting enormously Managing Data Looking at Data, Scalability And Cloud Services Database And Data Stores in Cloud Large Scale Data Processing

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Cloud Security[5L]

Infrastructure Security Network level security, Host level security, Application level security Data security and Storage Data privacy and security Issues, Jurisdictional issues raised by Data location Identity And Access Management Access Control Trust, Reputation, Risk Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations

Case Study on Open Source And Commercial Clouds[9L]

Eucalyptus Microsoft Azure Amazon EC2

Suggested Text / Reference Books:

1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010
2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wile, 2011
3. Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
4. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010

Paper Name: Pattern Recognition

Paper Code: IT 703B

Contacts: 3L

Credits: 3

Introduction to Pattern Recognition [2L]

Tree Classifiers Getting our feet wet with real classifiers [3L]

(a) Decision Trees: CART, C4.5, ID3. (b) Random Forests

Bayesian Decision Theory [2L]

Linear Discriminants Discriminative Classifiers: the Decision Boundary[3L]

(a) Separability (b) Perceptrons (c) Support Vector Machines

Parametric Techniques Generative Methods grounded in Bayesian Decision Theory [3L]

(a) Maximum Likelihood Estimation (b) Bayesian Parameter Estimation (c) Sufficient Statistics

Non-Parametric Technique [3L]

(a) Kernel Density Estimators (b) Parzen Window (c) Nearest Neighbor Methods

Unsupervised Methods Exploring the Data for Latent Structure [7L]

(a) Component Analysis and Dimension Reduction

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- i. The Curse of Dimensionality ii. Principal Component Analysis
- iii. Fisher Linear Discriminant iv. Locally Linear Embedding
- (b) Clustering
- i. K-Means ii. Expectation Maximization iii. Mean Shift

Classifier Ensembles [3L]

- (a) Bagging (b) Boosting / AdaBoost

Graphical Models The Modern Language of Pattern Recognition and Machine Learning [7L]

- (a) Introductory ideas and relation back to earlier topics (b) Bayesian Networks
- (c) Sequential Models
- i. State-Space Models ii. Hidden Markov Models iii. Dynamic Bayesian Networks

Theoretical Treatments in the Context of Learned Tools [4L]

- (a) No Free Lunch Theorem (b) Ugly Duckling Theorem (c) Bias-Variance Dilemma
- (d) Jackknife and Bootstrap Methods

Other Items Time Permitting [2L]

- (a) Syntactic Methods (b) Neural Networks

Suggested Text / Reference Books:

1. Pattern Classification, R.O.Duda, P.E.Hart and D.G.Stork, John Wiley, 2001
2. Pattern Recognition, S.Theodoridis and K.Koutroumbas, 4th Ed., Academic Press, 2009
3. Pattern Recognition and Machine Learning, C.M.Bishop, Springer, 2006

Paper Name: Compiler Design

Paper Code: IT-703C

Contacts: 3L

Credits: 3

Introduction to Compiling [3L]

Compilers, Analysis of the source program, The phases of the compiler, Cousins of the compiler.

Lexical Analysis [6L]

The role of the lexical analyzer, Tokens, Patterns, Lexemes, Input buffering, Specifications of a token, Recognition of a tokens, Finite automata, From a regular expression to an NFA, From a regular expression to NFA, From a regular expression to DFA, Design of a lexical analyzer generator (Lex).

Syntax Analysis [9L]

The role of a parser, Context free grammars, Writing a grammar, Top down Parsing, Non-recursive Predictive parsing (LL), Bottom up parsing, Handles, Viable prefixes, Operator precedence parsing, LR parsers (SLR, LALR), Parser generators (YACC). Error Recovery strategies for different parsing techniques.

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Syntax directed translation [5L]

Syntax director definitions, Construction of syntax trees, Bottom-up evaluation of S attributed definitions, L attributed definitions, Bottom-up evaluation of inherited attributes.

Type checking [4L]

Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions.

Run time environments [5L]

Source language issues (Activation trees, Control stack, scope of declaration, Binding of names), Storage organization (Subdivision of run-time memory, Activation records), Storage allocation strategies, Parameter passing (call by value, call by reference, copy restore, call by name), Symbol tables, dynamic storage allocation techniques.

Intermediate code generation [4L]

Intermediate languages, Graphical representation, Three-address code, Implementation of three address statements (Quadruples, Triples, Indirect triples).

Code optimization [5L]

Introduction, Basic blocks & flow graphs, Transformation of basic blocks, Dag representation of basic blocks, The principle sources of optimization, Loops in flow graph, Peephole optimization.

Code generations [4L]

Issues in the design of code generator, a simple code generator, Register allocation & assignment.

Suggested Text / Reference Books:

1. Aho, Sethi, Ullman - "Compiler Principles, Techniques and Tools" - Pearson Education.
2. Holub - "Compiler Design in C" - PHI.

Paper Name: VLSI Design

Paper Code: IT-704A

Contacts: 3L

Credits: 3

Module 1: [6L]

Introduction to VLSI Design: VLSI Design Concepts, Moor's Law, Scale of Integration (SSI, MSI, LSI, VLSI, ULSI – basic idea only), Types of VLSI Chips (Analog & Digital VLSI chips, General purpose, ASIC, PLA, FPGA), Design principles (Digital VLSI – Concept of Regularity, Granularity etc), Design Domains (Behavioral, Structural, Physical), Y-Chart, Digital VLSI Design Steps.

MOS structure: E-MOS & D-MOS, Charge inversion in E-MOS, Threshold voltage, Flat-band voltage, Potential balance & Charge balance, Inversion, MOS capacitances.

Module 2: [10L]

Micro-electronic Processes for VLSI Fabrication: Silicon Semiconductor Technology- An

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Overview, Wafer processing, Oxidation, Epitaxial deposition, Ion-implantation & Diffusion, Cleaning, Etching, Photo-lithography – Positive & Negative photo-resist

Basic CMOS Technology – (Steps in fabricating CMOS), Basic n-well CMOS process, p-well CMOS process, Twin tub process, Silicon on insulator

Layout Design Rule: Stick diagram with examples, Layout rules.

Module 3:[10L]

Three Terminal MOS Structure: Body effect.

Four Terminal MOS Transistor: Drain current, I-V Characteristics. Current-voltage equations (simple derivation).

Scaling in MOSFET: Short Channel Effects, General scaling, Constant Voltage & Field scaling.

CMOS: CMOS inverter, Simple Combinational Gates - NAND gate and NOR Gate using CMOS.

Module 4: [10L]

Hardware Description Language – VHDL or Verilog Combinational & Sequential Logic circuit Design.

Suggested Text / Reference Books:

1. CMOS Digital Integrated Circuit, S.M.Kang & Y.Leblebici, TMH.
2. Modern VLSI Design, Wayne Wolf, Pearson Education.
3. VHDL, Bhaskar, PHI.
4. Digital Integrated Circuit, J.M.Rabaey, Chandrasan, Nicolic, Pearson Education.
5. Advance Digital Design Using Verilog , Michel D. Celliti, PHI

Paper Name: Computer Vision and Robotics

Paper Code: IT-704B

Contacts: 3L

Credits: 3

Module 1[3L]

Image formation and Image model-Components of a vision system-Cameras-Radiometry-Light in space-Light in surface- sources, shadows and shading, Color-Human color perception-Representation of color- A model for image color-Surface color from image color

Module 2[3L]

Early vision-Linear Filters and Convolution-Shift variant Linear system- Spatial Frequency and Fourier Transforms-Sampling and Aliasing-Filters as Templates-Normalized correlation and finding patterns-Edge detection-Texture Representation ,Analysis and Application

Module 3 [4L]

Multiple images-The Geometry of multiple views-Stereopsis-Affine structure from motion-Elements of Affine Geometry-Affine structure and motion from two images-Affine structure and motion from multiple images-From Affine to Euclidean images.

Module 4 [5L]

Middle level vision-Segmentation by clustering-Shot Boundary Detection and Background Subtraction-Image segmentation by clustering pixels-Segmentation by Graph-Theoretic clustering-Segmentation by fitting a model-The Hough Transform-Fitting lines-Fitting curves- Fitting as a probabilistic inference problem-Robustness-Segmentation and fitting using probabilistic methods.

Module 5 [4L]

High level vision:-Geometric methods-Model based vision-Obtaining hypothesis by pose consistency, pose clustering and using Invariants- Verification-smooth surface and their outlines-Aspect graphs- Range data-Range Data segmentation- Range image Registration and model acquisition-Object Recognition.

Module 6 [2L]

Introduction -- brief history, types, classification and usage, Science and Technology of robots, Some useful websites, textbooks and research journals.

Module 7 [6L]

Elements of robots – links, joints, actuators, and sensors

Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and external sensors, common sensors – encoders, tachometers, strain gauge based force-torque sensors, proximity and distance measuring sensors, and vision.

Module 7 [5L]

Kinematics of serial and parallel robots

Introduction, Direct and inverse kinematics problems, Examples of kinematics of common serial manipulators, workspace of a serial robot, Inverse kinematics of constrained and redundant robots, Degrees-of-freedom of parallel mechanisms and manipulators, Active and passive joints, Constraint and loop-closure equations, Direct kinematics problem, Mobility of parallel manipulators, Inverse kinematics of parallel manipulators and mechanisms, Direct kinematics of Gough-Stewart platform.

Module 8 [3L]

Velocity and static analysis of robot manipulators

Linear and angular velocity of links, Velocity propagation, Manipulator Jacobians for serial and parallel manipulators, Velocity ellipse and ellipsoids, Singularity analysis for serial and parallel manipulators, Loss and gain of degree of freedom,

Module 9 [3L]

Dynamics of serial and parallel manipulators

Mass and inertia of links, Lagrangian formulation for equations of motion for serial and parallel

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manipulators, Generation of symbolic equations of motion using a computer, Simulation (direct and inverse) of dynamic equations of motion, Examples of a planar 2R and four-bar mechanism, Recursive dynamics,

Module 10 [3L]

Motion planning and control

Joint and Cartesian space trajectory planning and generation, Classical control concepts using the example of control of a single link, Independent joint PID control, Control of a multi-link manipulator, Non-linear model based control schemes, Simulation and experimental case studies on serial and parallel manipulators, Control of constrained manipulators, Cartesian control, Force control and hybrid position/force control, Advanced topics in non-linear control of manipulators.

Module 11 [4L]

Control considerations, Hardware Architecture, Hardware for joint controllers, Computational Speed, Robot Language, Robot Programming.

Suggested Text / Reference Books:

1. Computer vision – A modern Approach , David A forsyth & Jean ponce , Prentice Hall ,2002.
2. “Computer vision and Applications” , Bernd Jahne and Horst HauBecker Academic press ,2000.
3. K.S Fu R.C . CSG Lee-Robotics Control,Sensing, Vision & Intelligence,McGraw-Hill.
4. M.P. Groover, M.Weins,R.N. Nagel,N.C. Odrey –Industrial Robotics,McGraw Hill
5. Andrew C. Straugard-Robotics & AI,PHI
6. S.Sitharama Iyengar, Alberto Elefes -Autonomous Mobile Robots Control,Planning & Achitecture,IEEE Computer Society Press

Paper Name: Bioinformatics & DNA Computing

Paper Code: IT704C

Contacts: 3L

Credits- 3

MODULE 1: INTRODUCTION TO CELLULAR BIOLOGY 3L

Concepts of Cell, types of cell, components of cell, organelle. Functions of different organelles.

MODULE 2: THE CENTRAL DOGMA 9L

Concepts of DNA: Basic Structure of DNA; Double Helix structure; Watson and crick model. Exons and Introns and Gene Concept. Concepts of RNA: Basic structure, Difference between RNA and DNA. Types of RNA.

Concept of Protein: Basic components and structure. Introduction to Central Dogma: Transcription and Translation Introduction to Metabolic Pathways.

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MODULE 3: BIOINFORMATICS DATABASES

3L

Introduction to Bioinformatics. Recent challenges in Bioinformatics. Data Warehouse, Data models, Database Management Concepts. Different Bioinformatics database types. Protein Sequence Databases: PDB, SWISS-PROT database. DNA sequence databases: DDBJ, GenBank.

MODULE 4: BIOINFORMATICS SEARCH ENGINES

3L

Sequence database search programs like BLAST and FASTA. NCBI different modules: GenBank; OMIM, Taxonomy browser, PubMed.

MODULE 5: DNA SEQUENCE ANALYSIS AND DATA VISUALIZATION

12L

DNA Mapping and Assembly: Size of Human DNA, Copying DNA: Polymerase Chain Reaction (PCR), Hybridization and Microarrays, Cutting DNA into Fragments, Sequencing Short DNA Molecules, Mapping Long DNA Molecules. DeBruijn Graph. Sequence Alignment: Introduction, local and global alignment, pair wise and multiple alignments, Dynamic Programming Concept. Alignment algorithms: Needleman and Wunsch algorithm, Smith-Waterman.

MODULE 6: INTRODUCTION PROBABILISTIC MODELS USED IN COMPUTATIONAL BIOLOGY

9L

Probabilistic Models; Hidden Markov Model: Concepts, Architecture, Transition matrix, estimation matrix. Application of HMM in Bioinformatics: Gene finding, profile searches, multiple sequence alignment and regulatory site identification. Bayesian networks Model: Architecture, Principle, Application in Bioinformatics.

MODULE 7: BIOLOGICAL DATA CLASSIFICATION AND CLUSTERING

6L

Assigning protein function and predicting splice sites: Decision Tree

Suggested Text / Reference Books:

1. Bioinformatics and Molecular Evolution Paul G. Higgs and Teresa K. Attwood
2. Bioinformatics Computing By Bryan Bergeron
3. BIOINFORMATICS AND FUNCTIONAL GENOMICS Jonathan Pevsner
4. GENE CLONING AND DNA ANALYSIS T.A. BROWN

Paper Name: E Commerce Lab
Paper Code: IT791
Contracts: 3L
Credits- 2

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Following E-Commerce experiments are to be implemented using either VB, ASP, SQL or JAVA, JSP, SQL.

• Creating E-Commerce Site [3P]: Designing and maintaining WebPages. Advertising in the Website, Portals and Vortals.

E-Commerce Interaction [6P]: Comparison Shopping in B2C, Exchanges Handling in B2B, Interaction Examples: Virtual Shopping Carts.

• E-Commerce Applications [6P]: Online Store, Online Banking, Credit Card Transaction Processing.

Suggested Text / Reference Books:

1. E-Commerce through ASP by W Clarke- BPB
2. Beginning E-Commerce with VB, ASP, SQL Server 7.0 & MTS by Mathew Reynolds, Wrox Publishers
3. Professional Java Server Programming J2EE 1.3 Edition By Allamaraju et al, SPD.

Paper Name: C# and .NET Framework Lab

Paper Code: IT792

Contracts: 3L

Credits- 2

C#.NET:

- OOPs Concept
- Variables, Datatypes and Type System
- Loops
- Classes and Objects
- Inheritance
- Polymorphism
- Abstraction and Encapsulation
- Generics
- Null Coalesce Operator and Nullable Types
- Anonymous Types
- Properties
- Anonymous methods and Partial methods
- Delegates and Events
- Attributes and Reflection

Suggested Text / Reference Books:

1. Writing Solid Code - Steve Maguire
2. Mythical Man-Month - Frederick P. Brooks Jr

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3. Code Complete - Steve McConnell
4. The Art of Computer Programming - Knuth
5. Algorithms - Robert Sedgewick
6. Debugging Applications - John Robbins
7. Taligent's Guide to Designing Programs - Taligent
8. Design Patterns - Gamma, Helm, Johnson, Vlissides

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B. Tech in Information Technology

4th Year - Semester 8

Paper code	Name of the subjects	Periods			Credits	Marks		
		L	T	P		IE	FE	Total Marks
HU801	Industrial Management	3	1	0	2	30	70	100
IT801	Internetworking Technologies	3	1	0	3	30	70	100
IT802	A. Data Mining and Warehousing B. Real Time and Embedded Systems C. Building Enterprise Applications	3	0	0	3	30	70	100
IT803	A. Network Security & Cryptography B. Natural Language Processing C Remote Sensing and GIS	3	0	0	3	30	70	100
IT891	Software Testing Lab	0	0	3	2	40	60	100
IT892	Mobile Application Development Lab	0	0	3	2	40	60	100
IT881	Major Project	0	0	6	8	40	60	100
IT882	Grand Viva	0	0	0	2		100	100
MC881	General proficiency-IV (Practice Session for GRE,TOEFLE,CAT,MAT,GMAT etc.)	0	0	3	MANDATORY COURSE			
	Total	12	2	15	25	240	560	800

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B. Tech in Information Technology
4th Year - Semester 8

Paper Name: Industrial Management

Paper Code: HU 801

Contacts: 3L +1T

Credits: 4

Engineering/Technology Management:[4L]

objectives and functions of management, general and scientific management, strategic management, historical development and functions of engineering/technology management.

Quality Management: [10L]

Concept, Dimensions for goods and services, Cost of Quality, Statistical Quality Control, Control Charts, Acceptance Sampling (single).

Total Quality Management: Concept, benefits, Criticism.

New Quality Tools: Kaizen, Six Sigma, Quality Circles.

Productions Management: [10L]

Concept. Difference from Operations Management, Types of Production(Mass, Batch, Project), Functions of Production Management.

Productivity: Concept, Different Inputs and Productivity Measures, Efficiency and Effectiveness, Measures to increase Productivity.

Organizational Behavior: [8L]

Different Schools of Management Thought : Scientific Management, Administrative Theory, Theory of Bureaucracy, Human Relations Theory(Elton Mayo).

Motivation: Concept, Different Theories (Maslow, ERG, Herzberg,)

Communication: Purpose, process, Barriers to effective communication, Guidelines to make communication effective.

Perception: Process, Importance, Factors influencing perception, Shortcuts for judging people- Halo effect, Stereotyping, Projection.

Inventory Management:[7L]

Objectives of Inventory management, Levels of stock, Wilson EOQ model, EOQ model with discount, EOQ model with shortage, EOQ with Replenishment. ABC analysis, FSN analysis, VED analysis

Suggested Text / Reference Books

1. Industrial Management, Vol.1 L.C. Jhamb, EPH
2. Industrial Relations, Trade Unions & Labour Legislation - Sinha, Pearson Education Asia
3. Organizational Behaviour, S.P. Robbins, Prentice Hall
4. Productions and Operations Management, S. N. Chary, TMH
5. Productions and Operations Management, Joseph Monks, TMH

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Paper Name: Internetworking Technologies

Paper Code: IT801

Contacts: 3L +1T

Credits: 4

An Overview on Internet [4L] :

The need for an Internet, The TCP/IP Internet, Internet services, Internet protocols and standardization, Review of Network technologies. Internetworking Concepts [6L] : Architectural model introduction, Application level interconnection, Network level interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Gateways or routers, Internet and Intranet.

Internet Address [5L] :

Introduction, Universal identifiers, Three primary classes of IP addresses, Classless IP address, Network and Broadcast addresses, Mapping internet addresses to physical addresses (ARP), ARP protocol format, Transport Gateways and subnet addressing, Multicast addressing.

Internet Protocol [6L]:

Internet Architecture and Philosophy, The concept of unreliable delivery, Connectionless delivery system, The Internet Datagram, Routing direct and indirect delivery, Table driven IP routing, Protocol layering, Reliable stream transport, TCP performance, Bootstrap protocol (BOOTP).

Routing [7L] :

The origin of Gateway routing tables, Original Internet Architecture and Cores, Core Gateways, Automatic route propagation, Vector distance (Bellman-Ford), routing, Gateway to Gateway Protocol (GGP), Autonomous system concept, Exterior Gateway Protocol (EGP), Interior Gateway Protocol (RIP, OSPF, HELLO), Routing Information Protocol (RIP), Combining RIP, HELLO, and EGP, Routing with partial information.

Enterprise Networking [7L] :

Corporate networking, Broadband at the Metropolitan area level, High speed dedicated WAN services and switched WAN services, ISDN, BISDN and ATM services, Frame relay technology and services, Virtual private network concepts PPTP protocol.

Internet Servers [4L] :

DNS, DHCP Servers, FTP, TELNET, E-Mail

Firewall & Networking [6L] : Introduction, Implementation of Firewall, Activities of Firewall, Configuration of firewall, Firewalls & SSL, SSL implementation, Bit implementation of SSL, Use of SSL.

Suggested Text / Reference Books:

1. Computer Networks and Internets - Douglas E. Comer; PE.
2. Communication Networks - Leon-Garcia-Widjaja; TMH.
3. Internetworking with TCP / IP - Douglas E .Comer; PE.

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4. TCP/IP protocol suite - Forouzan Behrouz A; TMH.
5. Computer Networks – Andrew S. Tanenbaum; PHI.
6. Data and Computer Communication - William Stallings; PHI.
7. The Complete reference of Networking - Craig Zacker; TMH.

Paper Name: Data Mining & Warehousing

Paper Code: IT802A

Contacts: 3L

Credits- 3

Introduction : [2L]

Data warehousing – definitions and characteristics, Multi-dimensional data model, Warehouse schema.

Data Marts: [4L]

Data marts, types of data marts, loading a data mart, metadata, data model, maintenance, nature of data, software components; external data, reference data, performance issues, monitoring requirements and security in a data mart.

Online Analytical Processing : [4L]

OLTP and OLAP systems, Data Modeling, LAP tools, State of the market, Arbor Essbase web, Microstrategy DSS web, Brio Technology, star schema for multi-dimensional view, snowflake schema; OLAP tools.

Developing a Data Warehousing: [4L]

Building of a Data Warehousing, Architectural strategies & organizational issues, design considerations, data content, distribution of data, Tools for Data Warehousing.

Data Mining: [4L]

Definitions; KDD(Knowledge Discovery database) versus Data Mining; DBMS versus Data Mining, Data Mining Techniques; Issues and challenges; Applications of Data Warehousing & Data mining in Government.

Association Rules: [4L]

A priori algorithm, Partition algorithm, Dynamic inset counting algorithm, FP – tree growth algorithm; Generalized association rule. Clustering Techniques: Clustering paradigm, Partition algorithms, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; Categorical clustering, STIRR, ROCK, CACTUS.

Decision Trees: [4L]

Tree construction principle, Best split, Splitting indices, Splitting criteria, Decision tree construction with pre-sorting.

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Web Mining: [5L]

Web content Mining, Web structure Mining, Web usage Mining, Text Mining.

Temporal and Spatial Data Mining: Basic concepts of temporal data Mining, The GSP algorithm, SPADE, SPIRIT, WUM.

Suggested Text / Reference Books:

Texts:

1. Data Warehousing Fundamentals for IT Professionals, Second Edition by Paulraj Ponniah, Wiley India.
2. Data Warehousing –Concepts, Techniques, products, application; Prabhu; PHI.
3. Data Mining Techniques; A. K. Pujari; Universities Press.

References:

1. Data Mining, Practical Machine Learning Tools and Techniques, Third Edition; Ian H. Witten, Eibe Frank, Mark A. Hall
2. Data Warehousing, Data Mining, & OLAP – Second Edition by Alex Berson and Stephen J. Smith, TataMcGraw Hill Education
3. Data warehouse Toolkit by Ralph Kimball, Wiley India
4. Data Warehousing in the real world; Anahory; Pearson Education.
5. Data Mining Introductory & Advanced Topic; Dunham; Pearson Education.

Paper Name: Real Time and Embedded Systems

Paper Code: IT802B

Contacts: 3L

Credits- 3

Introduction:

Definition, Classification and Characterization; Challenges for Embedded Systems; Exemplary Embedded System.

Hardware Overview: Terminologies; Fundamental Components.

Interrupt & Interrupt Routines: Interrupt Basics; Shared Data between Interrupt Routines and Main Program; Interrupt Latency.

Real-Time Operating Systems: Introduction; Real-Time Operating system architecture; Task & Task States; Semaphore and Shared Data; Message Queue, Mailbox & Pipes; Timer & Events; Memory & Interrupt Management in RTOS environment.

Design Consideration: Encapsulating Semaphores and Queues; Saving Memory & Power; Hard Real-Time Scheduling Considerations; Scheduling Real-Time Tasks in Multiprocessors and Distributed Systems; Hardware Software Co-Design in an Embedded Systems.

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Commercial Real-Time Operating Systems: Unix or Windows as Real-Time Operating Systems; Real-Time POSIX Standard; A survey of Real-Time Operating Systems- PSOS, VRTX, VxWorks, QNX, microC/OS-II, RT Linux, Lynx, Windows CE.

Development Tools For Embedded Systems: Host and Target Machines; Compilers, Linker & Locaters; Transferring Firmware into the Target Systems; Debugging in Host Machine & Target Machines.

Real-Time & Embedded Systems Case Study: Smart Card (SOC-System On Chip); Digital Camera; Mobile Phones.

Suggested Text / Reference Books:

Texts:

1. Computers and Components, Wayne Wolf, Elseveir.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.

References:

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.
6. An Embedded Software Primer, David E. Simon, Pearson Education.

Paper Name: Building Enterprise Applications

Paper Code: IT802C

Contacts: 3L

Credit: 3

Unit I: 3L

Introduction to enterprise applications and their types, software engineering methodologies, life cycle of raising an enterprise application, introduction to skills required to build an enterprise application, key determinants of successful enterprise applications, and measuring the success of enterprise applications

Unit II: 6L

Inception of enterprise applications, enterprise analysis, business modeling, requirements elicitation, use case modeling, prototyping, non functional requirements, requirements validation, planning and estimation

Unit III: 12L

Concept of architecture, views and viewpoints, enterprise architecture, logical architecture, technical

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architecture - design, different technical layers, best practices, data architecture and design – relational, XML, and other structured data representations, Infrastructure architecture and design elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of application architecture and design.

Unit IV: 9L

Construction readiness of enterprise applications - defining a construction plan, defining a package structure, setting up a configuration management plan, setting up a development environment, introduction to the concept of Software Construction Maps, construction of technical solutions layers, methodologies of code review, static code analysis, build and testing, dynamic code analysis – code profiling and code coverage

Unit V: 6L

Types and methods of testing an enterprise application, testing levels and approaches, testing environments, integration testing, performance testing, penetration testing, usability testing, globalization testing and interface testing, user acceptance testing, rolling out an enterprise application.

Suggested Text / Reference Books:

- 1, Martin Fowler, ‘Patterns of Enterprise application Architecture’- Pearson.
2. Gamma et al, ‘Design patterns : elements of reusable object-oriented software’, Addison Wesley

Paper Name: Natural Language Processing

Paper Code: IT803B

Contacts: 3L

Credit: 3

Module I

5L

Introduction: Knowledge in Speech and Language Processing, Ambiguity, Models and Algorithms, Language, Thought, and Understanding, The State of the Art and the Near-Term Future.

Regular Expressions and Automata: Regular Expressions, Finite-State Automata, Regular Languages and FSAs.

Module II

5L

Word Classes and Part-of –Speech Tagging: (Mostly) English Word Classes, Tagsets for English, Part-of –Speech Tagging, Rule-Based Part-of –Speech Tagging, Stochastic Part-of –Speech Tagging, Transformation-Based Tagging, Other Issues.

Module III

6L

Context-Free Grammars for English: Constituency, Context-Free Rules and Trees, Sentences-

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Level Constructions, The Noun Phrase, Coordination, Agreement, The Verb Phrase and Subcategorization, Auxiliaries, Spoken Language Syntax, Grammar Equivalence and Normal Form, Finite-State and Context- Free Grammars, Grammars and Human Processing.

Module IV **6L**

Parsing with Context-Free Grammars: Parsing as Search, A Basic Top-Down Parser, Problems with the Basic Top-Down Parser, The Early Algorithm, Finite – State Parsing Methods.

Module V **5L**

Features and Unification: Feature Structures, Unification of Features Structures, Features Structures in the Grammar, Implementing Unification, Parsing with Unification Constraints, Types and Inheritance.

Module VI **6L**

Representing Meaning: Computational Desiderata for Representations, Meaning Structure of Language, First Order Predicate Calculus, Some Linguistically Relevant Concepts.

Semantic Analysis: Syntax-Driven Semantic Analysis, Attachments for a Fragment of English, Integrating Semantic Analysis into the Early Parser, Idioms and Compositionality, Robust Semantic Analysis.

Module VII **9L**

Discourse: Reference Resolution, Text Coherence, Discourse Structure, Psycholinguistic Studies of Reference and Coherence.

Natural Language Generation: Introduction to Language Generation, An Architecture for Generation, Surface Realization, Discourse Planning, Other Issues.

Module VIII Markov Models

Suggested Text / Reference Books:

Text Book:

1. D.Jurafsky & J.H.Martin- Speech and Language Processing, 4th Edn, Pearson Education.

Reference Book:

1. J. Allen – Natural Language Understanding, Pearson Education, New Delhi.

Paper Name: Remote Sensing and GIS

Paper Code: IT803C

Contacts: 3L

Credit: 3

Introduction and Overview of Geographic Information Systems [4L]

Definition of a GIS, features and functions; why GIS is important; how GIS is applied; GIS as an

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Information System; GIS and cartography; contributing and allied disciplines; GIS data feeds; historical development of GIS.

GIS and Maps, Map Projections and Coordinate Systems [4L]

Maps and their characteristics (selection, abstraction, scale, etc.); automated cartography versus GIS; map projections; coordinate systems; precision and error.

Data Sources, Data Input, Data Quality and Database Concepts [7L]

Major data feeds to GIS and their characteristics: maps, GPS, images, databases, commercial data; locating and evaluating data; data formats; data quality; metadata. Database concepts and components; flat files; relational database systems; data modeling; views of the database; normalization; databases and GIS.

Spatial Analysis [3L]

Questions a GIS can answer; GIS analytical functions; vector analysis including topological overlay; raster analysis; statistics; integrated spatial analysis.

Making Maps [6L]

Parts of a map; map functions in GIS; map design and map elements; choosing a map type; producing a map formats, plotters and media; online and CD-ROM distribution; interactive maps and the Web.

Implementing a GIS [5L]

Planning a GIS; requirements; pilot projects; case studies; data management; personnel and skill sets; costs and benefits; selecting a GIS package; professional GIS packages; desktop GIS; embedded GIS; public domain and low-cost packages.

Technology & Instruments involved in GIS & Remote Sensing [8L]

GIS applications; GIS application areas and user segments; creating custom GIS software applications; user interfaces; case studies. Future data; future hardware; future software; Object-oriented concepts and GIS; future issues – data ownership, privacy, education; GIS career options and how to pursue them.

Remote Sensing [8L]

Remote sensing of environment, E.M. Principle, Thermal infrared remote sensing, Remote sensing of Vegetation, Remote sensing of water, urban landscape

Suggested Text / Reference Books:

Texts:

1. “Principles of geographical information systems”, P. A. Burrough and R. A. McDonnell, Oxford.
2. “Remote sensing of the environment”, J. R. Jensen, Pearson

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References:

1. "Exploring Geographic Information Systems", Nicholas Chrismas, John Wiley & Sons.
2. "Getting Started with Geographic Information Systems", Keith Clarke, PHI.
3. "An Introduction to Geographical Information Systems", Ian Heywood, Sarah Cornelius, and Steve Carver. Addison-Wesley Longman.

Paper Name: Software Testing Lab

Paper Code: IT891

Weekly Practical Hrs : 3

Credit : 2

1. Introduction to QUICK Test professional
2. RFT (Rational Functional Tester) tool usage
3. JUnit - Test Framework
4. log4j - Architecture
5. Selenium IDE, Automated testing Tool

Paper Name : Mobile Application Development Lab

Paper Code: IT892

Contacts : 3

Credit : 2

1. Simulation of application using J2ME simulator
 - a. Midlet and other basic UI items.
 - b. Bluetooth API
 - c. Implementation of Wireless Messaging
 - d. MMAPI
2. Simulation of applications to access web sites using Microsoft Windows Mobile .net environment.
3. Simulation of Implementation of playing games and photo sharing applications using BREW (Binary Runtime Environment for Wireless Toolkit)
4. Simulation of Infotainment (news, weather forecasts etc) using WAP
5. Simulation of applications using symbian OS