Institute of Engineering & Technology Bundelkhand University Jhansi
STUDY & EVALUATION SCHEME
B. Tech Computer Engineering

Year Ist, Semester-I

SL No.	Course No.	Subjects	Periods			Evaluation Scheme				Subject Total
						Sessional			Examination	
		Theory	L	T	P	CA	TA	Total		
1.	CS-101	Information Technology	3	1	0	30	20	50	100	150
2.	MA-101	Mathematics-I	3	1	0	30	20	50	100	150
3.	CY-101	Chemistry	3	1	0	30	20	50	100	150
4.	ME-101	Mechanical Engineering	3	1	0	30	20	50	100	150
5.	HU-101	Professional Communication	3	1	0	30	20	50	100	150
		Practical/Training/Project								
6.	CS-151	Computer Programming Lab	0	0	2	-	20	20	30	50
7.	CY-151	Chemistry Lab	0	0	2	-	20	20	30	50
8.	ME-151	Mechanical Engineering Lab	0	0	2	-	20	20	30	50
9.	CE-151	Engineering Graphics Lab	0	0	2	-	20	20	30	50
10.	GP-101	General Proficiency	-	-	-	-	-	50	50	50
		Total	15	5	8					1000

INFORMATION TECHNOLOLY
CS-101/201

Unit – I : Fundamental Concept of Information
Information Concept and Processing: Definition of information, Data Vs Information, Introduction to Information representation in Digital Media, Text, image, graphics, Animation, Audio, Video etc., Need, Value and Quality of information, Concept of Information Entropy, Shannon's Principles, Entropy of Information, use of Entropy in Coding, Static & Dynamic codes, Category and Level of Information in Business Organization.
Information Representation: Information Content, Entropy, Data Compression, Shannon Fano, Huffman Coding, Extended Huffman Codes, Arithmetic Coding, LZ78, LZW coding, Introduction to JPEG, MPEG, MHEG and other IT Industry Standards.
Unit-II : Concepts in Computer & Programming
Computer Appreciation: Definition of Electronic Computer, History, Generations, Characteristic and Application of Computers, Classification of Computers, RAM/ROM, Computer Hardware, CPU, Various I/O devices, Peripherals, Storage Media, Software Definition, Role and Categories, Firmware and Humanwer.
Programming Language Classification & Program Methodology: Computer Languages, Generation of Languages, Translators-Interpreters, Compiler/Interpreters, Compilers, Flow, Charts, Dataflow Diagram, Assemblers, Introduction to 4GLs, Software Development Methodology, Life Cycles, Software Coding, Testing, maintenance, ISO, CMM standards for IT industry.
UNIT : III : Digital Devices and Basic Network Concepts
Digital Fundamentals: Various codes, decimal, binary, hexa decimal conversion, floating numbers gates, flip flops, adder, multiplexes, need for Data Transmission over distances, Types of Data Transmission, Media for Data Transmission, Modulation, AM, FM, Digital Modulation, Multiplexing of Signals.
Data Communication & Networks: Computer Networks, Networking of computers- Introduction of LAN and WAN. Network Topologies, Basic Concepts in Computer Networks, Client-server Architecture, ISDN, ATM, Token based protocol, CSMA/CD, Mobile Communication.
UNIT-IV : Internet and Web Technologies
Internet & World Wide Web: Hypertext Markup Language, DHTML, WWW, Gopher, FTP, Telnet, Web Browsers, Net Surfing, Search Engines, Email, ISP, EDI, E-Commerce, Public Key Private Key, Safety of Business Transaction on web.
Web Technologies: Elementary Concepts of E-Commerce, Basic Infrastructures for E-Commerce, Electronic Token, Security Threats, Electronic Payment Systems, Digital Signatures, Network, Security, Firewall, Introduction to Web Technologies.
UNIT-V : Concepts in Operating System, Office Tools and Data Management
Introductory concepts in operating system & Data Management: Elementary Concepts in Operating System, textual Vs GUI Interface, Introduction to DOS, MS Windows, MS office Tools, MS WORD, MS EXCEL, MS Power Point, Tools for Data Management, Basics of Database management system, Introduction to basic Commands of Dbase, Foxpro, SQL Etc.
IT Industry Trends, Careers and Applications in India: Scientific, Business, Educational and Entertainment Application, Industry Automation, Weather Forecasting, Awareness of Ongoing IT projects in India NICNET, BRNET etc. Application of IT to other Areas E Commerce, electronic governance, Multimedia, Entertainment.

References:
1.   D S Yadav, "Foundations of IT", New Age, Delhi
2.   Curtin, "Information Technology : Breaking News", TMH
3.   Rajaraman, "Introduction to Computers", PHI
4.   Nelson, "Data Compression", BPB.
5.   Peter Nortans "Introduction to Computers", TMH.
6.   Leon & leon "Fundamental of information Technology", Vikas
7.   Kanter, "Managing Information System"
8.   Lehngart, "Internet 101", Addison Wesley
9.   CIS tems "Internet, An Introduction", Tata McGraw Hill.

MATHEMATICS-I
MA-101

Unit - I :   Matrices   **9**
Elementary row and column transformation, Rank of matrix, Linear dependence, Consistency of linear system of equations, Characteristic equation, Caley-Hamition Theorom, Eigen values and eigen vectors, Diagonalisation, Complex and unitary materices .

Unit - II : Differential Catculus-I   **8**
Leibnitz theorem, Partial differentiation, Eulers theorem, Curve tracing, Change of variables, Expansion of function of several variables

Unit - III : Differntial Caluculus-II   **7**
Jacobian, , Approximation of errors, Exterma of functions of several variables, Lagranges method of multipliers (Simple applications).

Unit - IV : Multiple Integrals   **7**
Double and triple integral, Change of order, Change of variables, Beta and Gamma functions, Application to area, volume, Dirichlet integral and applications.

Unit - V : Vector Calculus   **7**
Point functions, Gradient, divergence and curl of a vector and their physical interpretations, Line, Surface and Volume integrals, Greens, Stokes and Gauss divergence theorem.

CHEMISTRY
CY-101

Unit – I

1. Molecular theory of diatomic heteromolecules, Bond theory of bonding in metals, Hydrogen bonding.
2. Solid state Chemistry:

    Radius Ratio Rule, Space lattice (only cubes), Type of unit cell, Bragg's Law, Calculation of Density of unit cell.

    One & Two Dimensional solids, graphite as two dimensional solid and its conducting properties. Fullerene & its applications.

Unit-II

1. Basic principles of spectroscopic methods. The use of UV, Visible, IR, ^{1}H NMR, for the determination of structure of simple organic compounds.
2. Characteristics and classification of polymers.
3. Structures of the following polymers, viz, Natural and synthetic rubbers, Polyamide and Polyester fibres, polymethylmethacrylate, poly acrylonitrile and polystyrene. A brief account of conducting polymers (polypyrrole & polytiphene) & their applications.

Unit-III

1. Stability of reaction intermediates, e.g. Carbanion, Carbocation and free radicals. Types of organic reactions, & Mechanism of nucleophilic substitution reaction.
2. Mechanism of the following reactions.

    (i) Aldol condensation. (ii) Cannizzaro reaction (iii) Beckmann rearrangement (iv) Hofmann rearrangement, and (v) Diels-Alder reaction
3. E-Z Nomenclature. Optical Isomerism of organic Compounds containing one chiral center. Examples of optically active compounds without chirality. Conformations of butane.

Unit-IV

1. Order & Molecularity of reactions. First & Second order reactions. Energy of activation.
2. Phase Rule: Its application to one component system (Water).
3. Equilibrium Potential, electrochemical cells (galvanic & concentration cells), Electrochemical theory of corrosion & protection of corrosion.

Unit-V

1. Hardness of water, softening of water by Lenny-S process & Reverse osmosis. Treatment of boiler feed water by Calgon process, Zeolites and ion-exchange resins.
2. Classification of fuels, Coal, Biomass & Biogas. Determination of gross and net calorific values using Bomb Calorimeter.
3. Environmental pollution : Types of pollution & pollutants, Air Pollution. Formation and depletion of ozone, smog and Acid rain.

References:

1. Organic Chemistry (Morrison & Boy)
2. Inorganic Chemistry (I.D. Lee)
3. Physical Chemistry (Barrow)
4. Environmental chemistry (Manahan)

MECHANICAL ENGINEERING
ME-101/201

A. THERMODYNAMICS
Unit – I : Fundamental Concepts and Definitions: Definition of thermodynamics, system, surrounding and universe, phase, concept of continuum, macroscopic & microscopic point of view. Density, specific volume, pressure, temperature. Thermodynamic equilibrium, property, state, path, process, cyclic process, Energy and its form, work and heat, Enthalpy.   3

Laws of thermodynamics: Zeroth law: Concepts of Temperature, zeroth law.   1

First law: First law of thermodynamics. Concept of processes, flow processes and control volume, Flow work, steady flow energy equation, Mechanical work in a steady flow of process.   2

Second law: Essence of second law, Thermal reservoir, Heat engines. COP of heat pump and refrigerator. Statements of second law. Carnot cycle, Clausius inequality. Concept of Entropy.   3

Unit – II : Properties of steam and thermodynamics cycles: Properties of steam, use of property diagram, Steam-Tables, processes involving steam in closed and open systems. Rankine cycle.   4

Introduction to I.C. Engines-two & four stoke S.I. and C.I. engines. Otto cycle, Diesel cycle.   3

B. MECHANICS AND STRENGTH OF MATERIALS
Unit-III : Force system and Analysis: Basic concept: Laws of motion. Transfer of force to parallel position. Resultant of planer force system. Free Body Diagrams, Equilibrium and its equation.   4

Friction: Introduction, Laws of Coulomb friction, Equilibrium of bodies involving dry fiction-Belt Friction.   2

Unit-IV : Structure Analysis:Beams: Introduction, Shear force and Bending Moment, shear force and Bending Moment Diagram for statically determinate beams.   4

Trusses: Introduction, Simple Trusses, Determination of Forces in simple trusses members, methods of joints and method of section.   3

Unit-V : Stress and Strain Analysis: Simple stress and strain: Introduction, Normal shear stresses, stress-strain diagrams for ductile and brittle materials, Elastic constants, one dimensional loading of members of varying cross sections, strain Energy.   3

Compound stress and strains: Introduction, state of plane stress, Principal stress and strain, Mohr's stress circle.   2

Pure Bending of Beams: Introduction, Simple Bending theory, Stress in Beams of different cross sections.   2

Torsion: Introduction, Torsion of Shafts of circular section, Torque and Twist, Shear stress due to Torque.   2

Reference:
1. Van Wylen G.J. & Sonnlog R.E.: Fundamentals of classical thermodynamics, John Wiley & Sons, Inc. NY.
2. Wark Wenneth : Thermodynamics (2nd edition), Mc Graw Hill book Co. NY.
3. Holman, J.P. : Thermodynamics, MC Graw Hill book Co. NY.
4. Yadav R : Thermodynamics and Heat Engines, Vol I & II (Sl Edition) Central Publishing House Allahabad.
5. Yadav R. : Steam & Gas Turbines.
6. Kshitish Chandra Pal : Heat Power, Orient Longman Limited, 17, Chittranjan Avenue, Calcutta.
7. S. Rao, B.B. Parulekar, 'Energy Technology', Khanna Pub., New Delhi.
8. G. H. Ryder : "Strength of Materials".
9. F. L. Singer : "Strength of Materials".
10. Timoshenko : "Strength of Materials".

PROFESSIONAL COMMUNICATION
HU-101

Unit – I : Technical Communication   8

Nature; Origin and Scope; Feature and General Writing; Significance; Style: Objective Style as Contrary to Literary Composition. Forms of Technical Communication: Reports: Types, Significance, Structure & Style of Report; Writing of Reports: Project, Thesis, Dissertation Writing; Technical Paper & Scientific Article Writing: Elements, Methods & Technical Objectives; Technical Proposal: Nature, Divisions, Kinds, Uses.

Unit-II : Pre-Requisites of Technical Written Communication   9

Vocabulary Building : Homophones (Words Similar in sound but different in Meanings); Word-formation; One-Word substitute; New & Select Vocabulary Building (about 500 words)

Functional Grammar : Patterns and Correct usage (Parts of speech); Syntax Concord; Prepositions; Articles.

Requisites of Good Sentence and Paragraph Writing: Requisites of Good Sentence Writing; Paragraph Writing; Unity, Coherence and Emphasis; Development of Paragraph: Inductive Order, Deductive Order, Spatial, Linear, Chronological Orders etc. with Emphasis on Argumentative & Expository Writing.

Unit : III : Business Correspondence: Principles; Features; Sales and Credit Letters: Letters of Enquiry, Quotation, Order, Claim, Complaint and Adjustment letters, Bio-Data Making, Resumes/Job Application Processing.   7

Unit-IV : Language Learning Through Thematic and Value based Critical Reading (Non-Detailed Text Study) :

A Study of following Value-Oriented Essays:

A.L.Basham	: The Heritage of India	Virginia Wooef	: How should one Read a Book
S. Radhakrishnan	: *The Gandhian Outlook*	R.K. Narayan	: *A Bookish Topic*
Francis Bacon	: *Of Studies*	C.E.M. Joad	: The Civilization of Today
J.B. Priestley	: Making Writing Simple		

Study of following Short Stories for making the Students acquaint with the styles of great Writers of World:

O.H. Henry	: The Gift of the Magi	M.R. Anand	: The Barber's Trade Union
R.N. Tagore	: The Renunciation	Ruskin Bond	: The Eyes Are Not Here
Katherine Mansfield	: *The Fly*	D.H. Lawrence	: The Rocking Horse Winner
A.P. Chekhor	: *The Lament*	Ernest Hemingway	: The Capital of the World

Unit-V : Dimensions of Spoken English: Using English Language Laboratory :   6

Stress, Intonation, Rhythm, Phonemes, Allophones, Phonetic Transcription, Listening, Reading & Comprehension of Speech and Reproduction of Response.

Texts Books/ References

Singh R.P. (ed)	:	An Anthology of English Essay; OUP, New Delhi
Singh R.P. (ed)	:	An Anthology of English Short Stories; OUP, New Delhi.
Hornby A.S.	:	Guide to Patterns & Usage in English; OUP, New Delhi
Clark S. & Pointon	:	Word for Word; OUP, New Delhi
Ruther Ford A.	:	Basic Communication Skills; Person Education, New Delhi.
Singh R.P.	:	Functional Skills in Language & Literature; OUP, New Delhi
Bansal R.K. & Harrison:		Phonetics in English; Orient Longman, New Delhi
Sethi & Dhamija	:	A Course in Phonetics & Spoken English; Prentice Hall, New Delhi.
Blum Rosen	:	Word Power; Cambridge University Press, New Delhi
Seely John	:	Writing Report; OUP, New Delhi
Suggested Readings :		
Arora V.N. etal	:	Improve Your Writing; OUP Delhi
Mohan K. & Sharma R.C.:		Business Correspondence of Report Writing; TMH, New Delhi.
Clive Upton etal	:	Oxford Dictionary of Pronunciation for Current English; OUP New Delhi.
		A Dictionary of Modern English Usages; OUP, New Delhi
Michael Swan	:	Practical English Usages; OUP, New Delhi
John Alveyblrideh	:	American English Pronouncing Dictionary; OUP New Delhi.
Jons Daniel	:	English Pronouncing Dictionary; Cambridge University Press.

COMPUTER PROGRAMMING LAB
CS-151 / 251

List of Practical
1. Practice have all internal and External DOS Commands
2. Write simple batch program
3. Giving exposure to Windows environment
4. File and program management in windows
5. Practice of all UNIX commands
6. Write simple shell script
7. Introduction to text editing and word processing
8. Exposure to advance feature supported by some editors
9. Net Surfing
10. Creation and usage of E-mail account
11. Write small program using C language
12. Handling of data structure in C
13. Familiarizing mail account using PINE, deleting, creating folder/ mail-messages, adding Signature, creating directory of addresses.

Note: List may be modified according to new software available.

MECHANICAL ENGINEERING LAB
ME-151 / 251

List of Practicals

1. Study of boiler models - Babcock Wilcox, Lancashire and Locomotive.

2. Study of Steam engine and steam turbine models.

3. Study of 2-stroke and 4-stroke I.C.E. models.

4. Study of Fiat engine and/ or Diesel engine prototype.

5. Study of a vapour compression Refrigeration unit tutor/refrigerator.

6. Study of a window type air conditioner.

7. To conduct the tensile test on a UTM and determine ultimate Tensile strength, percentage elongation for a steel specimen.

8. To conduct the compression test and determine the ultimate compressive strength for a specimen.

9. To conduct the Impact test (Izod / charpy) on the Impact testing machine and to find the impact strength.

11. To determine the hardness of the given specimen using Brinell / Rockwell / Vicker testing machine.

CHEMISTRY PRACTICALS (CY-151)
[Revised w.e.f. 2004-2005]

1. Determination of alkalinity in the given water sample.

2. Determination of temporary and permanent hardness in water sample using EDTA as standard solution.

3. Determination of available chlorine in bleaching powder.

4. Determination of chloride content in the given water sample by Mohr's method.

5. Determination of iron content in the given ore by using external indictor

6. pH-metric titration.

7. Determination of Equivalent weight of Iron by the chemical displacement method. The equivalent weight of copper is 63.5

    (Note : the procedure to be followed in carrying the above experiment is given as annexure)

8. Viscosity of an addition polymer like polyster by Viscometer.

9. Determination of iron concentration in sample of water by colorimetric method. The method involves the use of KCNS as colour developing agent and the measurements are carried out at $_{max}$ 480 nm.

    Note : The general procedure of estimation is given on pp653-8 of the textbook of Quantitative Chemical Analysis by A.I. Vogel 6th Edition, Publisher : Pearson education Ltd. 2000)

10. Element detection & functional group identification in organic compounds

Annexure

In this experiment we will determine the equivalent weight of Iron, which displaces one equivalent of copper (63.5 g) from a solution containing copper ions.

Procedure: Clean a sample of iron (strip measuring 3.5cm×1.5cm) with a sand paper and weigh it accurately. Place it in a clean beaker (250ml) and pour into it 100ml of $CuSo_4$ solution of known strength (~ N/10) Allow the strip to stand in the beacker for about 30 minutes. Carefully withdraw the strip of iron (from the beaker) with a forceps and place it on a porcelain plate contained in a desiccafor (using cacl$_2$ as a desiccant). The quantity of copper sulphate remaining in solution – after the chemical displacement, is estimated by lodometric titration method. The dried strip of iron (containing the deposited copper) is then carefully weighed.

Observations:

Weight of iron strip = …………….g

Wt. Of iron strip + copper = ………………g

(after drying)

wt. of copper deposited on iron strip

Initial conc. of cu- final conc. of cu. (determined by titration)

The weight of iron, which goes into solution(as Fe So $_4$)

(Initial weight of iron strip + weight of deposited copper) - weight of iron strip along with copper (after drying)

$$\frac{\text{Eq.wt. of copper } (63.5)}{\text{Eq. Wt. of Iron}} = \frac{\text{Wt. of Copper Deposited}}{\text{Wt. of Fe}_{(s)} \text{ (going into solution)}}$$

The Eq. Wt. of Fe = ?

The % error involved in the experiment =……………….

ENGINEERING GRAPHICS
CE-151 / 251

1. Introduction

Graphics as a tool to communicate ideas, Lettering and' dimensioning, Construction of geometrical figures like pentagon and hexagon.   2

2. Orthographic Projection

Principles of orthographic projections, Principal and auxiliary planes, First and Third angle projections.   1

Projection of points. Pictorial view.   1

Projection of lines parallel to both the planes. Parallel to one and inclined to other, Inclined to both the planes. Application to practical problems.   3

Projection of solid in simple position, Axis or slant edge inclined to one and parallel to other plane, Solids lying on a face or generator on a plane.   2

Sectioning of solids lying in various positions, True shape of the section.   2

Development of lateral surfaces, sheet metal drawing.   1

3. Isometric Projection

Principles of isometric projection, Isometric projection using box and offset methods.   2

References:
1. Bhatt. N.D.: Elementary Engineering Drawing, Charothar Publishing.
2. Laxmi Narayan V & Vaish W. : A Text Book of Practical Geometry on Geometrical drawing.

Institute of Engineering & Technology Bundelkhand University Jhansi
STUDY & EVALUATION SCHEME
B. Tech Computer Engineering

Year Ist, Semester-II

SL No.	Course No.	Subjects	Periods			Evaluation Scheme				Subject Total
						Sessional			Examination	
		Theory	L	T	P	CA	TA	Total		
1.	MA-201	Mathematics II	3	1	0	30	20	50	100	150
2.	PH-201	Physics	3	1	0	30	20	50	100	150
3.	ES-201	Environmental Study	3	1	0	30	20	50	100	150
4.	EC-201	Electronics Engineering	3	1	0	30	20	50	100	150
5.	EE-201	Electrical Engineering	3	1	0	30	20	50	100	150
		Practical/Training/Project								
6.	PH-251	Physics Lab	0	0	2	-	20	20	30	50
7.	EE-251	Electrical Engineering Lab	0	0	2	-	20	20	30	50
8.	WS-251	Workshop Practice	0	0	2	-	20	20	30	50
9.	HU-251	Communication Lab (English)	0	0	2	-	20	20	30	50
10.	GP-201	General Proficiency	-	-	-	-	-	50	50	50
		Total	15	5	8					1000

MATHEMATICS II

MA-201

Unit - I : Differential Equations   **8**
Ordinary differential equations of first order, Exact differential equations, Linear differential equations of first order, Linear differential equations of nth order with constant coefficients, Complementary functions and particular integrals, Simultaneous linear differential equations, Solutions of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems (without derivation).

Unit - II : Series Solutions and Special Functions   **8**
Series solutions of ODE of 2nd order with variable coefficients with special emphasis to differential equations of Legendre, and Bessel . Legendre polynomials, Bessels functions and their properties.

Unit - III : Laplace Transform   **7**
Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Inverse Laplace transform, Unit step function. Dirac delta function, Laplace transform of periodic functions, Convolution theorem, Application to solve simple linear and simultaneous differential equations.

Unit - IV : Fourier Series and Partial Differential Equations   **8**
Periodic functions, Trignometric series, Fourier series of period 2π , Eulers formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series.

Introduction of partial differential equations, Linear partial differential equations with constant coefficients of 2nd order and their classifications - parabolic, elliptic and hyperbolic with illustrative examples.

Unit - V : Applications of Partial Differential Equations   **7**
Method of separation of variables for solving partial differential equations,Wave equation up to two-dimensions, Laplace equation in two-dimensions, Heat conduction equations up to two-dimensions, Equations of transmission Lines.

PHYSICS
PH-201/101

Unit – I : Relativistic Mechanics

Inertial and Non-inertial Frames, Michelson-Morley Experiment, Postulates of Special Theory of Relativity, Galilean and Lorentz Transformation, Length Contraction and Time Dilation, Addition of Velocities, Mass Energy Equivalence and Variation of Mass with Velocity.   **6**

Unit – II : Interference

Coherent Sources, Conditions of Interference, Fresnel's Biprism Experiment, Displacement of Fringes, Interference in Thin Films – Wedge Shaped Film, Newton's Rings.   **4**

Diffraction : Single and n-Slit Diffraction, Diffraction Grating, Raleigh's Criterion of Resolution, Resolving Power of Telescope, Microscope and Grating.   **5**

Unit – III : Polarization

Phenomenon of Double Refraction, Ordinary and Extra-ordinary Rays, Nicol Prism, Production and Analysis of Plane, Circularly and Elliptically Polarized Light, Fresnel Theory, Optical Activity, Specific Rotation, Polarimeter.   **5**

Laser : Principle of Laser Action, Einstein's Coefficients, Construction and Working of He-Ne and Ruby Laser.   **3**

Unit – IV : Electromagnetics

Ampere's Law and Displacement Current, Maxwell's Equations in Integral and Differential Forms, Electromagnetic Wave Propagation in Free Space and Conducting Media, Poynting Theorem**.**   5

Magnetic Properties of Materials

Basic Concept of Para- , Dia and Ferro-Magnetism, Langevin's Theory of Diamagnetism, Phenomenon of Hysterisis and Its Applications   **4**

Unit – V : X-Rays

Diffraction of X-Rays, Bragg's Law, Practical Applications of X-Rays, Compton Effect.   **3**

Wave Mechanics : Wave Particle Duality, de Broglie Concept of Matter Waves, Heisenberg Uncertainty Principle, Schrödinger Wave Equation and Its Applications: Particle in a Box and One Dimensional Harmonic Oscillator.   **5**

References:
1. Robert Resmick : Introduction to Special Theory of Relativity
2. Aurthur Beiser : Perspectives of Modern Physics
3. A.K. Ghatak : Optics
4. Wehr Richords & Adiav : Physics of Atoms
5. O.Svelto : Lasers
6. D.J. Griffith : Electrodynamics

ENVIRONMENTAL STUDIES

ES - 201

Unit-I :

The Multidisciplinary nature of environmental studies   **2**

Definition, scope and importance, Need for public awareness

Natural Resources   6

Renewable and non-renewable resources

      Natural resources and associated problems.

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

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

  (c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

  (d) Food resources: World food problem, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

  (e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

  (f) Land resources: Land as resource, land degradation, man induced landslides, soil erosion and desertification.

1   Role of an individual in conservation of natural resources.

2   Equitable use of resources for sustainable lifestyles.

Unit-2 : Ecosystems   **6**

  1 Concept of an ecosystem.

  2 Structure and function of an ecosystem.

  3 Producers, consumers and decomposers.

  4 Energy flow in the ecosystem.

  5 Ecological succession.

  6 Food chains, food webs and ecological pyramids.

  7 Introduction, types, characteristic features, structure and function of the following ecosystem:

      (a) Forest ecosystem (b) Grassland Ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-3 : Biodiversity and its conservation   **7**

Introduction- Definition : genetic, species and ecosystem diversity, Biogeographical classification of India,Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India, Conservation of biodiversity: In-situ Ex-situ conservation of biodiversity.

Unit-4 : Environmental Pollution   8

Definition

  1   Causes, effects and control measures of-

      (a) Air Pollution. (b) Water Pollution. (c) Soil Pollution (d) Marine Pollution. (e) Noise
          Pollution. (f)Thermal Pollution. (g) Nuclear hazards.

  2   Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

  3   Role of an individual in prevention of pollution.

  4   Pollution case studies.

  5   Diaster management: floods, earthquake, cyclone and landslides.

Unit-5: Social Issues and the Environment   **5**

From Unsustainable to Sustainable development, Urban problems related to energy, Water
conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of
people; its problems and concerns. Case Studies, Environmental ethics: Issues and possible
solutions, Wasteland reclamation, Consumerism and waste products, Environment Protection Act,
Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act,
Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental
legislation, Public awareness.

Human Population and the Environment   4

Population growth, variation among nations, Population explosion- Family Welfare Programme,
Environment and human health, Human Rights, Value Education., HIV/AIDS, Women and Child
Welfare, Role of Information Technology in Environment and human health, Case Studies.

Suggested Field work

Visit to local area to document environmental assets-river/forest/grassland/hill/mountain, Visit to a
local polluted site-Urban/Rural /Industrial / Agricultural, Study of common plants, insects, birds,
Study of simple ecosystems-pond, river, hill slopes etc

References

1.   Agrawal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.

2.   Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd. Ahmedabad- 380 013,
      India Email : mapin@icenet.net (R)

3.   Brunner R.C., 1989, hazardous Waste Incineration, McGraw Hill Inc. 480p.

4.   Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)

5.   Cunningham, W.P, Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental
      Encycolopedia, Jaico Publ. House, Mubmbi, 1196p.

6.   De. A.K., Environmental Chemistry, Wiley Eastern Ltd.

7.   Down to Earth, Centre for Science and Environment (R)

8.   Gleick, H.P. 1993 Water in crisis, Pacific Institute for Studies in Dev., Environment & Security.
      Stockholm Env. Institute. Oxford Univ. Press. 473p.

9.   Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society,
      Bombay (R)

10.   Heywood, V.H. & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press
      1140p.

11.   Jadhav, H. & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House,
      Delhi 284p.

12. Mckinney, M.L. & School, R.M. 1996. Environmental Science Systems & Solutions, Web enhanced edition. 639p.
13. Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TM)
14. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)
15. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p.
16. Rai N,B, & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
17. Sharma B.K., 2001. Environmental Chemistry. Goel Publ. House Meerut.
18. Survey of the Environment, The Hindu (M)
19. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
20. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II, Environment Media (R)
21. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
22. Wagner K.D., 1998. Environment Management. W.B. Saunders Co. Philadelphia, USA 499p.
    (M) Magazine   (R) Reference (TB)   Textbook
23. Bharucha E, Text Book of Environmental Studies Universities Press (India Pvt. Ltd.)

ELECTRONICS ENGINEERING
EC-201/ 101

Unit – I
Semiconductor materials and properties

Group-IV materials, Covalent bond, electron-hole concepts	1
Basic concepts of energy bands in materials, concept of forbidden gap	2
Intrinsic and extrinsic semiconductors, donors and acceptors impurities	1

Junction diode

p-n junction	1
depletion layer	1
v-i characteristics, diode resistance, capacitance	1
diode ratings (average current, repetitive peak current, non-repetitive current, peak-inverse voltage).	1

Unit-II
Diode Applications

rectifiers (half wave and full wave)	1
calculation of transformer utilisation factor and diode ratings,	1
filter (C-filter), calculation of ripple factor and load regulation	2
clipping circuits, clamping circuits, voltage multipliers	2

Breakdown diodes

breakdown mechanisms (zener and avalanche)	1

| breakdown characteristics, zener resistance, zener diode ratings | 1 |
| zener diode application as shunt regulator | 2 |

Unit-III
Bipolar Junction Transistor

Basic construction, transistor action	1
CB, CE and CC configurations, input/output characteristics	2
Biasing of transistors-fixed bias, emitter bias, potential divider bias, comparison of biasing circuits	2

Transistor Amplifier

| Graphical analysis of CE amplifier, concept of voltage gain, current gain | 2 |
| h-parameter model (low frequency), computation of A_i, A_v, R_i, R_o of single transistor CE and CC amplifier configurations. | 2 |

Unit-IV
Field Effect Transistor

JFET: Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristic equation CG, CS and CD configurations, fixed-, self-biasing   3

MOSFET: depletion and enhancement type MOSFET-construction, operation and characteristics. 2

Computation of A_v, R_i, R_o, of single FET amplifiers using all the three configurations   1

Unit-V
Switching theory and logic design

Number systems, conversion of bases	5
Boolean algebra, logic gates, concept of universal gate, canonical forms.	2
Minimisation using K-map	1

Operational Amplifiers

Concept of ideal operational amplifiers, ideal op-amp parameters, inverting, non-inverting and unity gain amplifiers, adders, difference amplifiers, integrators   2

Books and reference:
1. Boylestad and Nashelsky, 'Electronic Devices and circuits' PHI, 6e, 2001.
2. A Mottershead, 'Electronic devices and circuits', PHI, 2000.

Morris Mano, 'Digital Computer Design', PHI, 2003.

ELECTRICAL ENGINEERING
EE-201/EE-101

Unit-I Steady State Analysis of A.C. Circuits :

Sinusoidal and phasor representation of voltage and current: single phase a.c. circuit-behaviour of resistance, inductance and capacitance and their combination in series & parallel and power factor, series parallel resonance-band width and quality factor : magnetic circuit.   8

Unit-II

D.C. Network Theory :

Circuit theory concepts-Mesh and node analysis.
Network Theorems- Super-position theorem. Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Star Delta transformation.

Measuring Instruments:

Construction and principle of operation of voltage and current measuring instruments; introduction to power and energy meters.   8

Unit-III

Three Phase A.C. Circuits :

Star-Delta connections, line and phase voltage/current relations, three phase power and its measurement.

Transformer :

Principle of operation, types of construction, phasor diagram, equivalent circuit, efficiency and voltage regulation of single phase transformer, O.C. and S.C. tests.   9

Unit-IV

D.C. Machines

Principle of electromechanical energy conversion, types of d.c. machines, E.M.F. equation, Magnetization and load characteristics, losses and efficiency, speed control d.c. motors, applications.

Three phase Synchronous Machines :

Principle of operation and application of synchronous motor.   8

Unit-V

8.   Three phase induction Motor

Principle of operation, types and methods of starting, slip-torque characteristics, applications.

9.   Single phase Induction Motor :

Principle of operation, methods of starting.   7

References :
1.   V. Del Toro. " Principles of electrical Engineering, "Prentice hall International.
2.   W.H. Hayt & J.E. Kennedy," Engineering circuit Analysis, "Mc Graw Hill.
3.   I.J. Nagrath, "Basic Electrical Engineering," Tata Mc. Graw Hill.
4.   A.e. Fitgerald, D.E., Higginbotham and A Grabel, "Basic Electrical Engineering " Mc Graw Hill.
5.   H. Cotton, "Advanced Electrical Technology" Wheeler Publishing.

PHYSICS PRACTICALS
PH-251 / 151

List of Experiments (Any Ten)
1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the specific rotation of cane sugar solution using half shade polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.
6. To determine the specific resistance of the material of given wire using Carey Foster's bridge.
7. To determine the variation of magnetic field along the axis of a current carrying coil and then to estimate the radius of the coil.
8. To verify Stefan's Law by electrical method.
9. To calibrate the given ammeter and voltmeter.
10. To study the Hall effect and determine Hall coefficient, carnier density and mobility of a given semiconductor material using Hall-effect set up.
11. To determine energy bank gap of a given semiconductor material.
12. To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
13. To draw hysteresis curve of a given sample of ferromagnetic material and from this to determine magnetic susceptibility and permeability of the given specimen.
14. To determine the balistic constant of a ballistic galvanometer.
15. To determine the viscosity of a liquid.

Note : Additional experiments may be added based on contents of syllabus.

ELECTRICAL ENGINEERING LAB
EE-251 / EE-151

List of Practicals

A minimum of 10 experiments from the following :

1. Verification of Network Theorems.
2. Study of diode characteristics.
3. To study a half wave and full wave rectifier circuit with and without capacitor filter and determine the ripple factor.
4. Determination of Common base and common emitter characteristics of a transistor.
5. Study of phenomenon of resonance in RLC series circuit.
6. Measurement of power in a three-phase circuit by two-wattmeter method.
7. Measurement of efficiency of a single-phase transformer by load test.
8. Determination of parameters and losses in a single-phase transformer by OC and SC test.
9. DC generator characteristics.
10. Speed control of dc shunt motor.
11. Study running and reversing of a three-phase induction motor.
12. Study of a single-phase energy meter.
13. To study the various logic gate (TTL).
    Additional experiments may be added based on contents of syllabi.

WORKSHOP PRACTICE
WS-251/151

1. **Carpentry Shop:** 1. Study of tools and operation and carpentry joints. 2. Simple exercise using jack plain. 3. To prepare half-lap corner joint, mortise and tennon joints. 4. Simple exercise on woodworking lathe.
2. **fitting Bench Working Shop :** 1. Study of tools and operations 2. Simple exercises involving filling work. 3. Making perfect male-female joint 4. Simple exercise involving drilling/tapping/dieing.
3. **Black Smithy Shop :** 1. Study of tools and operations 2. Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.
4. **Welding Shop :** 1. Study of tools and operations . 2. Simple butt joint. 3. Lap joint. 4. oxy acetylene welding.
5. **Sheet metal shop :** 1.Study of tools and operations. 2. Making funnel complete with soldering.
   3. Fabrication of tool box, tray, electrical panel box etc.
6. **Machine Shop :** 1. Study of tools and operations. 2. Plane turning. 3. Step turning. 4. Taper turning. 5. Threading. 6. Single point cutting tool grinding.

COMMUNICATION LAB (ENGLISH)
HU-251

(i)

(ii)   Orientation to Speech Sounds through International Phonetic Alphabets (I.P.S.) : British Received Pronunciation.

(iii) Speech Drills with Emphasis on Articulatory Phonetics, Place and Manner.

LIST OF PRACTICALS

Stress in Speech: Based on Accentual Patterns.

Intonation-Pattern-Practice: Rising, Falling and Level-Tones.

Rhythm in Speech-Practices On Strong and Weak-form Words.

Individual Conferencing / Speaking along with Quizzes.

Conversational Skills for Interview/ Seminars / Workshops with Emphasis on Kinesis along with Promotion of Phonetic-Script-Skills.

Group-Discussion: Practices based on Accurate & Current Grammatical Patterns.

Official / Public Speaking : Practices based on Mechanics of Articulation.

Theme Presentation-Practices Based on Linguistic Patterns.

Developing Argumentative Skills/ Role-Play Presentations with Proper Rhythmic Stress.

Testing comprehension : Reading and Listening Exercises with the use of Audio-Visual Aids.

Audience-based, Effective Speech Production (Elocution).

Institute of Engineering & Technology Bundelkhand University Jhansi
STUDY & EVALUATION SCHEME
B. Tech Computer Engineering

Year 2nd, Semester-III

SL No.	Course No.	Subjects	Periods			Evaluation Scheme				Subject Total
						Sessional			Examination	
		Theory	L	T	P	CA	TA	Total		
1.	CS-301	Discrete Structure	3	1	0	30	20	50	100	150
2.	CS-302	Data Structures Using C	3	1	0	30	20	50	100	150
3.	CS-303	Computer Based Numerical & Statistical Techniques	3	1	0	30	20	50	100	150
4.	EE-301	Network Analysis & Synthesis	3	1	0	30	20	50	100	150
5.	EC-302	Switching Theory	3	1	0	30	20	50	100	150
		Practical/Training/Project								
6.	EE-353	Network Lab	0	0	2	-	20	20	30	50
7.	CS-351	Numerical Tech. Lab	0	0	2	-	20	20	30	50
8.	CS-352	Data Structures Lab	0	0	2	-	20	20	30	50
9.	EC-352	Digital Electronic Lab	0	0	2	-	20	20	30	50
10.	GP-301	General Proficiency	-	-	-	-	-	50	50	50
		Total	15	5	8					1000

CS-301

DISCRETE STRUCTURES

L   T   P
3   1   0

Unit-I:
Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets
Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation.
Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions.
Theorem proving Techniques: mathematical induction (simple and strong), pigeonhole principle, prove by contradiction.

Unit-II:
Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

Unit-III:
Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded I and complemented lattices.
Boolean Algebra: Basic definitions, sum of products and product of sums, form in Boolean Algebra, Logic gates and Karnaugh maps.
Tree: Definition, Rooted tree, properties of trees, binary search tree, tree traversal.

Unit-IV:
Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

Unit-V:
Combinatorics & Graphs: Recurrence Relation, Generating function., Simple graph, multi graph, graph terminology, representation of graphs, Bipartite, Regular, Planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, Graph coloring, chromatic number, isomorphism and Homomorphism of graphs.

Text books and Supplementary reading:
1. Liptschutz, Seymour, " Discrete Mathematics", McGraw Hill.
2. Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", McGraw Hill.
3. Kenneth H. Rosen, "Discrete Mathematics and its applications", McGraw Hill.
4. Deo, Narsingh, "Graph Theory With application to Engineering and Computer.Science.", PHI.
5. Krishnamurthy, V., "Combinatorics Theory & Application", East-West Press Pvt. Ltd., New Delhi.

CS 302

DATA STRUCTURES USING - C

L T P

3 1 0

Unit - I
Introduction: Basic Terminology, Elementary Data Organization, Structure operations, Algorithm Complexity and Time-Space trade-off
Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Array as Parameters, Ordered List, Sparse Matrices and Vectors.
Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.
Recursion: Recursive definition and processes, recursion in C, example of recursion, Tower of Hanoi Problem, simulating recursion, Backtracking, recursive algorithms, principles of recursion, tail recursion, removal of recursion.

UNIT - II
Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues.
Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

UNIT – III
Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm.
Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

UNIT – IV
Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.
Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.

UNIT - V
Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential   Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.
File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

Reference text books:
1. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., New Delhi.
2. R. Kruse etal, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002
3. A. M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.

Supplementary reference books:
1. K Loudon, "Mastering Algorithms With C", Shroff Publisher & Distributors Pvt. Ltd.
2. Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in   C++", Jhon Wiley & Sons, Inc.
3. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia Pvt. Ltd.(Singapore)

CS-303

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

L T P

3 1 0

Unit-I

Introduction: Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation

Solution of Algebraic and Transcendental Equation:

Bisection Method, Iteration method, Method of false position, Newton-Raphson method, Methods of finding complex roots, Muller's method, Rate of convergence of Iterative methods, Polynomial Equations.

Unit-II

Interpolation: Finite Differences, Difference tables. Polynomial Interpolation**:** Newton's forward and backward formula. Central Difference Formulae: Gauss forward and backward formula, Sterling's, Bessel's, Everett's formula. Interpolation with unequal intervals: Lagrange's Interpolation, Newton Divided difference formula, Hermit's Interpolation,

Unit-III

Numerical Integration and Differentiation: Introduction, Numerical differentiation Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule.

Unit-IV

Solution of differential Equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta Methods, Predictor Corrector Methods, Automatic Error Monitoring and Stability of solution

Unit-V

Statistical Computation: Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines, Regression Analysis, Linear and Non linear Regression, Multiple regression, Statistical Quality Control methods.

References:

1. Rajaraman V, "Computer Oriented Numerical Methods", Pearson Education
2. Gerald & Whealey, "Applied Numerical Analyses", AW
3. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
4. Grewal B S, "Numerical methods in Engineering and Science", Khanna Publishers, Delhi
5. T Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods, TMH
6. Pradip Niyogi, "Numerical Analysis and Algorithms", TMH
7. Francis Scheld, " Numerical Analysis", TMH
8. Sastry S. S, "Introductory Methods of Numerical Analysis", Pearson Education.
9. Gupta C.B., Vijay Gupta, "Introduction to Statistical Methods", Vikas Publishing.
10. Goyal, M, "Computer Based Numerical and Statistical Techniques", Firewall Media, New Delhi.

EE 303

NETWORK ANALYSIS AND SYNTHESIS

L T P

3 1 0

Unit – I :
Graph Theory: Graph of a Network, definitions, tree, co tree , link, basic loop and basic cut set, Incidence matrix, cut set matrix, Tie set matrix Duality, Loop and Node methods of analysis.   7

Unit – II :
Network Theorems (Applications to ac networks): Super-position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem, Reciprocity theorem. Millman's theorem, compensation theorem, Tellegen's theorem.   5

Unit – III :
Network Functions :
Concept of Complex frequency , Transform Impedances Network functions of one port and two port networks, concept of poles and zeros, properties of driving point and transfer functions, time response and stability from pole zero plot, frequency response and Bode plots.

9

Unit – IV :
Two Port Networks:
Characterization of LTI two port networks ZY, ABCD and h parameters, reciprocity and symmetry. Inter-relationships between the parameters, inter-connections of two port networks, Ladder and Lattice networks. T & ∏ Representation.   7

Unit – V :
(a) Network Synthesis :
Positive real function; definition and properties; properties of LC, RC and RL driving point functions, synthesis of LC, RC and RL driving point immittance functions using Foster and Cauer first and second forms.

(b) Filters :
Image parameters and characteristics impedance, passive and active filter fundamentals, low pass, highpass,band pass, band elimination filters.   9

Text Books:
1.   M.E. Van Valkenburg," Network Analysis", Prentice Hall of India
2.   D.Roy Choudhary,"Networks and Systems" Wiley Eastern Ltd.
3.   Donald E. Scott : "An Introduction to Circuit analysis: A System Approach" McGraw Hill Book Company.
4.   A.Chakrabarti,"Circuit Theory" Dhanpat Rai & Co.

Reference Books :
5.   M.E. Van Valkenburg,"An Introduction to Modern Network Synthesis",Wiley Eastern Ltd.
6.   W.H. Hayt & Jack E-Kemmerly, Engineering Circuit analysis" Tata McGraw Hill.
7.   Soni, Gupta ,"Circuit Analysis", Dhanpat Rai & Sons.
8.   Ram Kalyan, Linear Circuits Oxford University Press.

SWITCHING THEORY

L   T   P
3   1   0

Unit-I : Introduction

Characteristics of digital system, Types of Digital circuits, Number system: Direct conversion between bases Negative numbers & BCD and their arithmetic's, Boolean Algebra, Minimization of Boolean Functions :Map & Tabular method upto 6 variable and miltiple output circuits Error detecting & correcting codes, Hamming & cyclic codes.   6

Unit-II : Combinational Logic Circuits

Design Procedure, Adders, subtractors & code conversion, Multiplexers/ Demultiplexers, encoder / decoders, decimal adders & amplitude comparators, ROM as decoder, PLA & PAL.

6

Unit-III : Sequential Logic Circuits

Flip –Flops and their conversions, Analysis and synthesis of synchronous sequential circuit, excitation table, state table & state diagram. Design of synchronous counters, shift registers and theie applications.

Algorithm State Machine: ASM chart, Timing considerations, Control Implementation Design with Multiplexers, PLA control

Asynchronous Sequential Circuits: Analysis Procedure Reduction of state & flow table, Race free state assignment.   10

Unit-IV : Logic Families

Diode, BJT & MOS as a switching element concept of transfer characteristics, Input characteristics and output characteristics of logic gates, Fan-in, Fan-out, Noise margin, circuit concept and comparison of various logic families: TTL, IIL, ECL, NMOS, CMOS Tri-state logic, open collector output, Interfacing between logic families, packing density, power consumption & gate delay.

8

Unit-V : Hazard and Fault Detection

Static and dynamic Hazard : Gate delay, Generation of spikes, Determination of hazard in combinational circuits, Fault detection methods: Fault Table & Path sensitizing methods.

5

Unit-VI : Memories

Sequential, Random Access, NMOS & CMOS Static and Dynamic Memory elements, one and multi-dimensional selection arrangement, Read-only memories, Formation of memory banks.

5

Text Books :
1. Digital Design by M Moris Mano, 2nd Edn.PHI
2. Introduction to Digital Microelectronic Circuits, by Gopalan, TMH

Reference Books :
1. Switching Circuit & Logic Design by Hill & Peterson, Wiley
2. Digital Circuit & Logic Design, by Holsworth.

EE-353

NETWORK LAB

L   T   P

0   0   3

Note : Minimum eight experiments are to be performed from the following list.

1. Verification of principle of superposition with dc and ac sources
2. Verification of Thevenin, Norton and Maximum power transfer theorems in ac circuits
3. Verification of Tellegin's theorem for two networks of the same topology
4. Determination of transient response of current in RL and RC circuits with step voltage input
5. Determination of transient response of current in RLC circuit with step voltage input for under damp, critically damp and over damp cases
6. Determination of frequency response of current in RLC circuit with sinusoidal ac input
7. Determination of z and h parameters (dc only) for a network and computation of Y and ABCD parameters
8. Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values
9. Determination of image impedance and characteristic impedance of T and ∏ networks, using O.C. and S.C. tests

    Write Demo for the following (in Ms-Power point)

10. Verification of parameter properties in inter-connected two port networks : series, parallel and cascade also study loading effect in cascade
11. Determination of frequency response of a Twin – T notch filter
12. College may add any three experiments in the above list.

CS- 352

DATA STRUCTURES LAB

L   T   P

0   0   2

Write Program in C or C++ for following.

1   Array implementation of Stack, Queue, Circular Queue, List.

2   Implementation of Stack, Queue, Circular Queue, List using Dynamic memory Allocation.

3   Implementation of Tree Structures, Binary Tree, Tree Traversal, Binary Search Tree, Insertion and Deletion in BST.

4   Implementation of Searching and Sorting Algorithms.

5   Graph Implementation, BFS, DFS, Min. cost spanning tree, shortest path algorithm.

CS-351

<div align="center">

NUMERICAL TECHNIQUES LAB

</div>

L T P
0 0 2

Write Programs in 'C' Language:

1. To deduce error envolved in polynomial equation.
2. To Find out the root of the Algebraic and Transcendental equations using Bisection, Regula-falsi, Newton Raphson and Iterative Methods. Also give the rate of convergence of roots in tabular form for each of these methods.
3. To implement Newton's Forward and Backward Interpolation formula.
4. To implement Gauss Forward and Backward, Bessel's, Sterling's and Evertt's Interpolation formula
5. To implement Newton's Divided Difference and Langranges Interpolation formula.
6. To implement Numerical Differentiations.
7. To implement Numerical Integration using Trapezoidal, Simpson 1/3 and Simpson 3/8 rule.
8. To implement Least Square Method for curve fitting.
9. To draw frequency chart like histogram, frequency curve and pie-chart etc.
10. To estimate regression equation from sampled data and evaluate values of standard deviation, t-statistics, regression coefficient, value of R^2 for atleast two independent variables.

EC-352

<div align="center">

DIGITAL ELECTRONICS LAB

</div>

L T P
0 0 3

1. Bread-board implementation of various flip-flops.
2. Bread-board implementation of counters & shift registers.
3. Determination of Delay time and NAND, NOR, Ex-OR, AND & OR Gates.
4. Transfer characteristics of TTL inverters & TTL Schmitt Trigger inverter.
5. Transfer characteristics of CMOS inverters series and CD40 series and estimation of Gate delay of CD40 series CMOS inverter.
6. Monoshot multivibrators using 74121 and 74123.
7. Clock circuit realization using 555 and CMOS inverter and quartz crystal.
8. Adder/ subtractor operation using IC7483 4 bit/ 8 bit.
9. Demultiplexer / Decoder operation using IC-74138.
10. Modulo N counter using programmable counter 74190.

Institute of Engineering & Technology, Bundelkhand University Jhansi
STUDY & EVALUATION SCHEME
B. Tech Computer Engineering

Year 2nd, Semester-IV

SL No.	Course No.	Subjects	Periods			Evaluation Scheme				Subject Total
						Sessional			Examination	
		Theory	L	T	P	CA	TA	Total		
1.	CS-401	Computer Organization	3	1	0	30	20	50	100	150
2.	CS-402	Database Management System	3	1	0	30	20	50	100	150
3.	CS-403	Object Oriented System	3	1	0	30	20	50	100	150
4.	CS-404	Software Engineering	3	1	0	30	20	50	100	150
5.	CS-405	Theory of Automata and Formal Language	3	1	0	30	20	50	100	150
		Practical/Training/Project								
6.	CS-451	Computer Organization Lab	0	0	2	-	20	20	30	50
7.	CS-452	Database Management System Lab	0	0	2	-	20	20	30	50
8.	CS-453	Java Lab	0	0	2	-	20	20	30	50
9.	CS-454	Software Engineering Lab	0	0	2	-	20	20	30	50
10.	GP-401	General Proficiency	-	-	-	-	-	50	50	50
		Total	15	5	8					1000

CS-401

COMPUTER ORGANIZATION

L   T   P

3   1   0

Unit-I

Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Microoperation, Arithmetic Logic Shift Unit, Design of Fast address, Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers.

Unit-II

Control Design:

Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (Register Transfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control, Micro programmed control(Microinstruction, Microprogram sequencing, Wide-Branch addressing, Microinstruction with Next-address field, Prefetching Microinstruction).

Unit-III

Processor Design:

Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer.

Unit -IV

Input-Output Organization:

I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.

Unit-V

Memory Organization:

Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of 2D and $2^{1/2}$D, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

Text Book: 1.   Computer System Architecture, M. Mano(PHI)

Reference Book: 1.   Computer Organization, Vravice, Zaky & Hamacher (TMH Publication)

          2.   Structured Computer Organization, Tannenbaum(PHI)

          3.   Computer Organization, Stallings(PHI)

          4.   Computer Organization, John P.Hayes (McGraw Hill)

CS-402

DATABASE MANAGEMENT SYSTEM

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Unit- I

Introduction: An overview of database management system, database system Vs file system, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

Data Modeling using the Entity Relationship Model:

ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

Unit- II

Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus,

Introduction to SQL: Characteristics of SQL. Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.

Unit- III

Data Base Design & Normalization:

Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

Unit- IV

Transaction Processing Concepts: Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

Unit- V

Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.

Text Books

 1 Date C J, "An Introduction To Database System", Addision Wesley

 2   Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill

 3   Elmasri, Navathe, "Fundamentals Of Database Systems", Addision Wesley

 4   Leon & Leon, "Database Management System", Vikas Publishing House.

References

1 Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication

2 Majumdar & Bhattacharya, "Database Management System", TMH

3 Ramakrishnan, Gehrke, "Database Management System", McGraw Hill

4. Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson Education.

5. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi.

TCS 403

OBJECT ORIENTED SYSTEMS

	L	**T**	**P**
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Unit – I

Object Modeling: Objects and classes, links and association, generalization and inheritance, aggregation, abstract class, multiple inheritance, meta data, candidate keys, constraints.

Unit – II

Dynamic Modeling: Events and states, operations, nested state diagrams and concurrency, advanced dynamic modeling concepts, a sample dynamic model.

Unit – III

Functional Modeling: Data flow diagram, specifying operations, constraints, a sample functional model.OMT (object modeling techniques) methodologies, examples and case studies to demonstrate methodologies, comparisons of methodologies, SA/SD, JSD.

Unit – IV

Java Programming: Introduction, Operator, Data types, Variables, Methods & Classes, Multithread Programming, I/O, Java Applet.

Java Library: String Handling, Input/Output exploring Java.io, Networking, Applets classes, Event Handling, Introduction to AWT, Working with window, Graphics, AWT Controls, Layout Manager and Menus, Images, Additional packages.

Unit – V

Software Development using Java:

Java Beans, Java Swing, Java Servlets, Migrating from C++ to java, Application of java, Dynamic Billboard Applet, Image Menu: An image based menu, Lavatron Applets, Scrabblets, JDBC, Brief functioning of upper layer E-mail and their applications.

Text Books:
1. James Rumbaugh etal, "Object Oriented Modeling and Design", PHI
2. Herbert Schieldt, "The Complete Reference: Java", TMH.
3. E. Balagurusamy, "Programming in JAVA", TMH.

References:
1. Booch Grady, "Object Oriented Analysis & Design with application 3/e", Pearson Education, New Delhi.
2. Bjarne Stroustrup, "C++ Programming Language", Addison Wesley
3. E. Balagurusamy, "Object Oriented Programming with C++", TMH.

CS-404

SOFTWARE ENGINEERING

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Unit-I: Introduction
Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes.
Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

Unit-II: Software Requirement Specifications (SRS)
Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS.
Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

Unit-III: Software Design
Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design.
Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

Unit-IV: Software Testing
Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products.
 Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

Unit-V: Software Maintenance and Software Project Management
Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools.
Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

Reference Books:
1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
3. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
4. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
5. Ian Sommerville, Software Engineering, Addison Wesley.
6. Pankaj Jalote, Software Engineering, Narosa Publication
7. Pfleeger, Software Engineering, Macmillan Publication.
8. A. Leon and M. Leon, Fundamentals of Software Engineering, Vikas Publication.

CS-405

THEORY OF AUTOMATA & FORMAL LANGUAGES

L   T   P

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Unit – I

Introduction to defining language, Kleene closures, Arithmetic expressions, defining grammar, Chomsky hierarchy, Finite Automata (FA), Transition graph, generalized transition graph.

Unit – II

Nondeterministic finite Automata (NFA), Deterministic finite Automata (DFA), Construction of DFA from NFA and optimization, FA with output: Moore machine, Mealy machine and Equivalence, Applications and Limitation of FA

Unit – III

Arden Theorem, Pumping Lemma for regular expressions, Myhill-Nerode theorem, Context free grammar: Ambiguity, Simplification of CFGs, Normal forms for CFGs, Pumping lemma for CFLs, Decidability of CFGs, Ambiguous to Unambiguous CFG.

Unit – IV

Push Down Automata (PDA): Description and definition, Working of PDA, Acceptance of a string by PDA, PDA and CFG, Introduction to auxiliary PDA and Two stack PDA.

Unit – V

Turing machines (TM): Basic model, definition and representation, Language acceptance by TM, TM and Type – 0 grammar, Halting problem of TM, Modifications in TM, Universal TM, Properties of recursive and recursively enumerable languages, unsolvable decision problem, undecidability of Post correspondence problem, Church's Thesis, Recursive function theory, Godel Numbering.

Text Books and References:

1. Hopcroft, Ullman, "Introduction to Automata Theory, Language and   Computation", Nerosa Publishing House
2. K.L.P. Mishra and N.Chandrasekaran, "Theory of Computer Science(Automata, Languages and Computation)", PHI
3. Martin J. C., "Introduction to Languages and Theory of Computations", TMH
4. Papadimitrou, C. and Lewis, C.L., "Elements of theory of Computations", PHI
5. Cohen D. I. A., "Introduction to Computer theory", John Wiley & Sons
6. Kumar Rajendra, "Theory of Automata (Languages and Computation)", PPM

COMPUTER ORGANIZATION LAB
CS-451

1. Bread Board Implementation of Flip-Flops.
2. Experiments with clocked Flip-Flop.
3. Design of Counters.
4. Bread Board implementation of counters & shift registers.
5. Implementation of Arithmetic algorithms.
6. Bread Board implementation of Adder/Subtractor (Half, Full)
7. Bread Board implementation of Binary Adder.
8. Bread Board implementation of Seven Segment Display.
    *Institute may also develop the experiment based on the infrastructure available with them.

CS-452

Java Programming LAB

1. Write a java program to print "Hello"
2. Write a java program that reads your name from command line argument & print Hello *name.*
3. Input any integer n through keyboard and display all prime numbers between 1 and n.
4. Write a java program to generate fibonacci series.
5. Write a program to test command line arguments. Display total number of arguments and also display one argument in one line.
6. Write a Java program to input any integer n through command line argument and display ODD numbers between 1 and n as well as display EVEN numbers between 1 and n
7. Write a java program to simulate a simple calculator. Provide 2 Nos. and an operator as a command line argument to perform the operation of addition, subtraction, multiplication, division, modulo, power. If the operator is not a valid, give appropriate message.
8. Write a java program to print the table of 11 to 20.
9. Create a class Matrix to represent n x m matrix. Add methods for matrix addition, subtraction, multiplication.
10. Write a java class to store countries and their capitals. Write functions to add new country detail, to change the capital of a country, given a country name find capital and vice versa.
11. Create an applet to draw our national flag.
12. Write a java application that has three Buttons labeled Red, Green, Blue & on clicking the background color should change accordingly & have a label displaying the color selected.
13. Write a program to count the total no. of chars, words, lines, alphabets, digits, white spaces of a given file. Before counting, check whether the file really exists or not.if exists, is it readable? Also give file size.
14. Write an application that creates and starts three threads. Each thread is instantiated from the same class. It executes a loop with 10 iterations.Each iteration displays string "HELLO", sleeps for 300 milliseconds. The application waits for all the threads to complete & displays the message "Good Bye...".
15. Write an application that executes two threads. One thread displays "Good Morning" every 1000 milliseconds & another thread displays "Good Afternoon" every 3000 milliseconds. Create the threads by implementing the Runnable interface.

CS-453

Software Engineering LAB

1. To study about Software Characteristics.
2. To study about various kinds of software applications.
3. Explain various Software myths.
4. To study about various kinds of Risks.
5. To study about Risk assessment.
6. To study about Risk mitigation(RMMM)
7. To study about requirement specification.
8. To study about Requirement Engineering.
9. To study about System Modeling.
10. To study about architecture of analysis
11. To study about Software Design
12. To study about various kinds of testing techniques.
13. To study about object oriented analysis and design
14. Implementation of one project using software engineering.

CS-454

DBMS LAB

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The Queries to be implemented on DBMS by using SQL.

1. Write the queries for Data Definition and Data Manipulation language.

2. Write SQL queries using Logical operators (=,<,>,etc.).

3. Write SQL queries using SQL operators (Between…. AND, IN(List), Like, ISNULL and also with negating expressions).

4. Write SQL query using character, number, date and group functions.

5. Write SQL queries for Relational Algebra (UNION, INTERSECT, and MINUS, etc.).

6. Write SQL queries for extracting data from more than one table (Equi-Join, Non-Equi-Join , Outer Join)

7. Write SQL queries for sub queries , nested queries.

8. Write programs by the use of PL/SQL.

9. Concepts for ROLL BACK, COMMIT & CHECK POINTS.

10. Create VIEWS, CURSORS, and TRIGGRS & write ASSERTIONS.

11. Create FORMS and REPORTS .

* Students are advised to use **Developer 2000/Oracle-9i** version or other latest version for above listed experiments. However depending upon the availability of software's, students may use **Power Builder /SQL SERVER**. Mini Project may also be planned & carried out through out the semester to understand the important various concepts of Database.

Institute of Engineering & Technology Bundelkhand University Jhansi
STUDY & EVALUATION SCHEME
B. Tech Computer Engineering

Year 3rd, Semester-V

SL No.	Course No.	Subjects	Periods			Evaluation Scheme				Subject Total
						Sessional			Examination	
		Theory	L	T	P	CA	TA	Total		
1.	CS-501	Computer Graphics	3	1	0	30	20	50	100	150
2.	CS-502	Compiler Design	3	1	0	30	20	50	100	150
3.	CS-503	Design & Analysis of Algorithms	3	1	0	30	20	50	100	150
4.	CS-504	Principle of Programming Languages	3	1	0	30	20	50	100	150
5.	HU-501	Industrial Economics & Principles of Management	3	1	0	30	20	50	100	150
		Practical/Training/Project								
6.	CS-551	Computer Graphics Lab	0	0	2	-	20	20	30	50
7.	CS-552	Compiler Design Lab	0	0	2	-	20	20	30	50
8.	CS-553	Design & Analysis of Algorithms Lab	0	0	2	-	20	20	30	50
9.	CS-554	Mini Project Lab* Lab	0	0	2	-	20	20	30	50
10.	GP-501	General Proficiency	-	-	-	-	-	50	50	50
		Total	15	5	8					1000

* Chosen anyone from the followings (Computer Graphics, Compiler Design, and Design & Analysis of Algorithms)

CS-501

COMPUTER GRAPHICS

Unit-I

Line generation: Points lines, Planes, Pixels and Frame buffers, vector and character generation. Graphics Primitives: Display devices, Primitive devices, Display File Structure, Display control text.

Unit-II

Polygon: Polygon Representation, Entering polygons, Filling polygons. Segments: Segments table, creating deleting and renaming segments, visibility, image transformations.

Unit-III

Transformations: Matrices transformation, transformation routines, displays procedure. Windowing and Clipping: Viewing transformation and clipping, generalize clipping, multiple windowing.

Unit-IV

Three Dimension: 3-D geometry primitives, transformations, projection clipping. Interaction: Hardware input devices handling algorithms, Event handling echoing, Interactive techniques.

Unit-V

Hidden Line and Surface: Back face removal algorithms, hidden line methods. Rendering and Illumination: Introduction to curve generation, Bezier, Hermite and B-spline algorithms and their comparisons.

References :

1. Rogers, "Procedural Elements of Computer Graphics", McGraw Hill

2. Asthana, Sinha, "Computer Graphics", Addison Wesley Newman and Sproul, "Principle of Interactive Computer Graphics", McGraw Hill

3. Steven Harrington, "Computer Graphics", A Programming Approach, 2nd Edition

4. Rogar and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill.

CS-502

COMPILER DESIGN

Unit-I
Introduction to Compiler, Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Implementation of lexical analyzers, lexical-analyzer generator, LEX-compiler, Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.

Unit-II
Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables, constructing LALR sets of items.

Unit-III
Syntax-directed Translation: Syntax-directed Translation schemes, Implementation of Syntax-directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser. More about translation: Array references in arithmetic expressions, procedures call, declarations, case statements.

Unit-IV
Symbol Tables: Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors.

Unit-V
Introduction to code optimization: Loop optimization, the DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.

Textbook:
Aho, Sethi & Ullman, "Compiler Design", Addision Wesley.

CS-503
DESIGN & ANALYSIS OF ALGORITHMS

Unit -I
Introduction: Algorithms, analysis of algorithms, Growth of Functions, Master's Theorem, Designing of Algorithms. Sorting and order Statistics: Heap sort, Quick sort, Sorting in Linear time, Medians and Order Statistics.

Unit -II
Advanced Data Structure: Red-Black Trees, Augmenting Data Structure. B-Trees, Binomial Heaps, Fibonacci Heaps, Data Stricture for Disjoint Sets.

Unit -III
Advanced Design and Analysis Techniques: Dynamic Programming, Greedy Algorithms, Amortized Analysis, Back Tracking.

Unit -IV
Graph Algorithms: Elementary Graphs Algorithms, Minimum Spanning Trees, Single-source Shortest Paths, All-Pairs Shortest Paths, Maximum Flow, Traveling Salesman Problem.

Unit -V
Selected Topics: Randomized Algorithms, String Matching, NP Completeness, Approximation Algorithms.

References:

1. Coreman, Rivest, Lisserson, : "Algorithm", PHI.
2. Basse, "Computer Algorithms: Introduction to Design & Analysis", Addision Wesley.
3. Horowitz & Sahani, "Fundamental of Computer Algorithm", Galgotia.

CS-504

PRINCIPLES OF PROGRAMMING LANGUAGES

Unit -I

Introduction: Characteristics of programming Languages, Factors influencing the evolution of programming language, developments in programming methodologies, desirable features and design issues. Programming language processors: Structure and operations of translators, software simulated computer, syntax, semantics, structure, virtual computers, binding and binding time.

Unit -II

Elementary and Structured Data Types: Data object variables, constants, data types, elementary data types, declaration, assignment and initialization, enumeration, characters, strings. Structured data type and objects: Specification of data structured types, vectors and arrays, records, variable size data structure, pointers and programmer constructed data structure, Sets files. Sub Program and programmer defined data types: Evolution of data types, abstractions, encapsulations, information hiding, sub programmes, abstract data types.

Unit -III

Sequence Control; Implicit and Explicit sequence control, sequence control with within expression and statements, recursive sub programmes, exception handling, co routines, Scheduled sub programmes, concurrent execution. Data control referencing environments, static and dynamic scope, local data local data referencing environment, shared data: Explicit common environment dynamic scope parameter passing mechanism.

Unit -IV

Storage Management: Major run time requirements, storage management phases, static storage management, stack based, heap based storage management. Syntax and translation: General syntactic criteria, syntactic element of a language, stages in translation, formal syntax and semantics.

Unit -V

Operating and Programming Environment: Batch Processing Environments, Embedded system requirements, Theoretical models, Introduction to Functional Programming, Lambda calculus, Data flow language and Object Oriented language, Comparison in various general and special purpose programming languages e.g. Fortran, C, Pascal, Lisp, etc.

References:

1. Terrance W Pratt, "Programming Languages: Design and Implementation" PHI
2. Sebesta, "Concept of Programming Language", Addison Wesley
3. E Horowitz, "Programming Languages", 2nd Edition, Addison Wesley
4. "Fundamentals of Programming Languages", Galgotia.

HU 501

INDUSTRIAL ECONOMICS AND
PRINCIPLES OF MANAGEMENT

Industrial Economics:

Unit –1.Introduction: Nature and significance of Economics. Meaning of Science, Engineering and Technology and their relationship with economic development.

Unit –2. Basic Concept: The concept of demand and supply. Elasticity of Demand and Supply. Indifference Curve Analysis, Price Effect, Income Effect and Substitution Effect.

Unit –3. Money and Banking: Functions of Money, Value of Money, Inflation and measures to control it. Brief idea of functions of banking system, viz., Commercial and central banking, Business fluctuations.

Management:

Unit –4. Introduction: Definition, Nature and Significance of Management,. Evaluation of Management thought, Contributions of Max Weber, Taylor and Fayol.

Unit –5. Human Behaviour: Factors of Individual Behaviour, Perception, Learning and Personality Development, Interpersonal Relationship and Group Behaviour.

References:
1. Dewett, K.K. / Modern Economic Theory/S.Chand & Co.
2. Luthers Fred/ Organizational Behaviour.
3. Prasad L.M./ Principles of Management.
4. A.W. Stonier & D.C. Horgne / A TextBook of Economic Theory/ Oxford Publishing House Pvt. Ltd.

CS-551
COMPUTER GRAPHICS LAB

1. Implementation of line generation using slope's method, DDA and Bresenham's algorithms.
2. Implementation of circle generation using Mid-point method and Bresenham's algorithms.
3. Implementation of ellipse generation using Mid-point method.
4. Implementation of polygon filling using Flood-fill, Boundary –fill and scan line algorithms.
5. Implementation of 2-D transformation: Translation, Scaling, rotation, Mirror Reflection and sharing (write a menu driven program).
6. Implementation of line clipping using Cohen-Sutherland algorithm and Bisection Method.
7. Implementation of Polygon clipping using Sutherland-Hodgeman algorithms.
8. Implementation of 3-D geometric transformations: Translation, Scaling and rotation.
9. Implementation of curve generation using Interpolation methods.
10. Implementation of Curve generation using B-spline and Bezier curves.
11. Implementation of any one of back face removal algorithm (such that depth-buffer algorithm, Painter's algorithm, Warnock's algorithm, Scan line algorithm)

CS-552
COMPILER DESIGN LAB

1. Simulation of Finite state Automata to recognize the tokens of various control staments.
2. Simulation of Finite state machine to distinguish among Integers, Real numbers with Exponents.
3. Program in LEX toll to recognize the tokens and return to token found fir a C like language.
4. Parsing of arithmetical and algebraic expressions and equations.
5. Use to YACC tool to parse the statements of C like language.

CS-553
DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY WORK

Programming assign to each algorithmic strategy:

1. Divide and conquer methd (quick sort, merge sort, Strassen's matrix multiplication).
2. Greedy method (knapsack problem, job sequencing, optimal merge patterns, minimal spanning trees).
3. Dynamic programming (multistage graphs, OBST, 0/1 knapsack, traveling salesperson problem).
4. Back tracking (n-queens problem, graph coloring problem, Hamiltonian cycles).
5. Sorting: Insertion sort, Bubble sort and Heap sort.
6. Searching: Sequential and binary search.
7. Selection: Minimum / maximum, kth smallest element.

Institute of Engineering & Technology Bundelkhand University Jhansi
STUDY & EVALUATION SCHEME
B. Tech Computer Engineering

Year 3rd, Semester-VI

Year 3rd, Semester-VI

SL No.	Course No.	Subjects	Periods			Evaluation Scheme				Subject Total
						Sessional			Examination	
		Theory	L	T	P	CA	TA	Total		
1.	CS-601	Operating System	3	1	0	30	20	50	100	150
2.	CS-602	Computer Network	3	1	0	30	20	50	100	150
3.	CS-603	Artificial Intelligent	3	1	0	30	20	50	100	150
4.	CS-604	Elective –I*	3	1	0	30	20	50	100	150
5.	HU-601	Organizational Behavior	3	1	0	30	20	50	100	150
		Practical/Training/Project								
6.	CS-651	Operating System Lab	0	0	2	-	20	20	30	50
7.	CS-652	Computer Network Lab	0	0	2	-	20	20	30	50
8.	CS-653	Artificial Intelligent Lab	0	0	2	-	20	20	30	50
9.	CS-654	Mini Project Lab**	0	0	2	-	20	20	30	50
10.	GP-601	General Proficiency	-	-	-	-	-	50	50	50
		Total	15	5	8					1000

*Elective –I (Graph Theory / Probability & Stochastic Process / **Principles of Operations Research**)

** Mini Project: Chosen anyone from the followings (Operating Systems, Computer Networks and Artificial Intelligence)

CS-601
OPERATING SYSTEMS

Unit -I
Introduction: [02] Operating System and Function, Evolution of Operating System, Batch, Interactive, Time Sharing and Real Time System, System Protection. Operating System Structure: [04] , ' System Components, System Structure, Operating System Services.

Unit - II
Concurrent Processes: [06] Process Concept, Principle of Concurrency, Producer / Consumer Problem, Critical Section, Problem, Semaphores, Classical Problems in Concurrency, Inter Processes Communication, Process Generation, Process Scheduling.

Unit - III
CPU Scheduling: [05] Scheduling Concept, Performance Criteria Scheduling Algorithm, Evolution, Multiprocessor Scheduling. Deadlock: [05] System Model, Deadlock Characterization, Prevention, Avoidance and Detection, Recovery From Deadlock Combined Approach.

Unit - IV
Memory Management: [06] Basic Machine, Resident Monitor, Multiprogramming with Fixed Partition, Multiprogramming With Variable Partition, Multiple Base Register, Paging, Segmentation, Paged Segmentation, Virtual' Memory Concept, Demand Paging, Performance, Paged Replaced Algorithm, Allocation of Frames, Thrashing, Cache Memory Organization, Impact on Performance.

Unit - V
I/O Management & Disk Scheduling: [04] I/O Devices and The Organization of I/O Function, I/O Buffering, Disk I/O, Operating System Design Issues. File System: [04] File Concept, File Organization and Access Mechanism, File Directories, File Sharing, Implementation Issues.

References:
1. Milenekovie, "Operating System Concept", McGraw Hill.
2. Petersons, "Operating Systems", Addision Wesley.
3. Dietal, "An Introduction to Operating System", Addision Wesley.
4. Tannenbaum, "Operating System Design and Implementation", PHI.
5. Gary Nutt, "Operating System, A Modern Perspective", Addision Wesley.
6. Stalling, Willium, "Operating System", Maxwell Macmillan
7. Silveschatza, Peterson J, "Operating System Concepts", Willey.
8. Crowley, "Operating System", TMH.

CS-602

COMPUTER NETWORKS

Unit -I

Introduction Concepts: Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design. Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

Unit-II

Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

Unit - III

Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control Internetworking -TCP / IP - IP packet, IP address, IPv6. '

Unit - IV

Transport Layer: Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

Unit-V

Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application, Example Networks - Internet and Public Networks.

References:

1. Forouzen, "Data Communication and Networking", TMH

2. A.S. Tanenbaum, "Computer Networks", 3rd Edition, Prentice Hall India, 1997.

3. S. Keshav, "An Engineering Approach on Computer Networking", Addison Wesley, 1997

4. W. Stallings, "Data and Computer Communication", Macmillan Press, 1989.

CS- 603

ARTIFICIAL INTELLIGENCE

UNIT -I

Introduction

Introduction to Artificial Intelligence, Simulation of sophisticated & Intelligent Behavior in different area problem 3OIving in games, natural language, automated reasoning, visual perception, heuristic algorithm versus solution guaranteed algorithms.

UNIT - II

Understanding Natural Languages.

Parsing techniques, context free and transformational grammars, transition nets, augmented transition nets, Fillmore's grammars, Shanks Conceptual Dependency, grammar free analyzers, sentence generation, and translation.

UNIT III

Knowledge Representation

First order predicate calculus, Horn Clauses, Introduction to PROLOG, Semantic Nets, Partitioned Nets, Minskey frames, Case Grammar Theory, Production Rules Knowledge Base, The Interface System, Forward & Backward Deduction.

UNIT - IV

Expert System

Existing Systems (DENDRAL, MYCIN) domain exploration Meta Knowledge, Expertise Transfer, Self Explaining System

UNIT - V

Pattern Recognition

Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception Semantic & Model, Object Identification, Speech Recognition.

Programming Language

Introduction to programming Language, LISP, PROLOG

References:

1. Charnick "Introduction to A.I.", Addision Wesley
2. Rich & Knight, "Artificial Intelligence"
3. Winston, "LISP", Addision Wesley
4. Marcellous, "Expert System Programming", PHI
5. Elamie, "Artificial Intelligence", Academic Press
6. Lioyed, "Foundation of Logic Processing", Springer Verlag

CS-604
Principles of Operations Research

Unit-I
Linear programming problems: Linear programming problems (LPP)- Formulation of a LPP-graphical method-Simplex method- Revised simplex method-two phase method-Dual simplex method-Primal-Dual Problem (Emphasis should be on algorithms and problems).

Unit-II
Transportation and Assignment problem: Principles of duality-Interpretation sensitivity analysis-degeneracy-Integer (Linear) programming, branch and bound method computational procedure application of IP,0-1 linear programming problem, Knapsack problem, facility location problem assignment problems, mathematical formulation, fundamental theorem, Hungarian method for solving an assignment problem , variation of an assignment problem, Application(Emphasis should be more on problem than theory).

Unit-III
CPM and PERT: CPM and PERT- network diagram-Events and activities- project planning-reducing critical events and activities-critical path calculations-Examples- Resources and man power leveling. Sequencing problems-travelling salesman problems –machine-scheduling problem (Job-shop).

Unit-IV
Replacement problems and Inventory models: Replacement problems-capital equipment-Discounting costs-Replacement in anticipation of failure-Group replacement –stochastic nature underlying the failure phenomenon. Inventory models-various costs-Deterministic inventory models-Economic lot sizes –Price breaks –Finite storage.

Unit-V
Inventory Model Application and Dynamic programming: Single period inventory model with shortest cost-stochastic models-Application of inventory models. Dynamic programming formulation-Investment problem-general allocation problem –storage coach problem-production scheduling.

References:
1. H.A. TAHA, "Operations Research- An Introduction", Macmillan1976.
2. Hillier and Liebarman: "Introduction to operation research" , (1990) Mc Graw Hill, Company.
3. Ecker and Kuperfersch mid: "Introduction to Operation research" (1988), John Wiley & Sons.
4. B.E. Gillet, "introduction to Operation Research-A Computer oriented Algorithmic Approach", McGraw Hill 1989
5. K.Swarup, P. K. Gupta & A. Manmohan, "Operation Research", S.chand 1978.

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CS-605(1)

ORGANIZATIONAL BEHAVIOR

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Introduction to Organizations and individuals:
What is organization, components of organization, nature and variety of organizations (in terms of objective structure etc.), Models of analyzing organizational phenomena, organizational and business variables, organizations in the Indian context, institutions and structures, basic role in the organization, etc. perceptions, attitudes, motives (achievement, power and affiliation), commitment, values, creativity and other personality factors, profile of manager and a entrepreneur.

Interpersonal and group processes:
Interpersonal trust under standing the other person from his/her point of view, Interpersonal communication, listening feedback, counseling, transactional analysis, self fulfilling prophecy, etc. leadership, motivating people, working as a member of a team, team functioning, team decision making, team conflict resolution, team problem solving.

Organizational structure and integrating Interpersonal and group dynamic elements of structure, functions of structures, determinants of structures, dysfunctional ties of structures, structure – technology? Environment people relationships, principle-underlying design of organizational politics, issues of power and authority, organizational communications, organizational change, integrating cases(s), case method and lectures should be supplemented with a variety of other methodologies such as feedback on questionnaires and tests, role plays, and behavior simulation exercise.

References :
1. Jit S Chandan "Organizational Behavior", Vikas
2. M.N. Mishra :Organization Behavior", Vikas
3. Arnold, John, Robertson, Ivan 1. and Cooper, Cary, I.," Work Psychology:understanding human behavior in the workplace", Macmillan India Ltd., Delhi. 1996.
4. Dwivedi, RS., Human relations and organizational behavior: a global perspective, Macmillan India Ltd., Delhi, .1995.
5. Hersey and Blanchard (6th ed.). "Management of organizational behavior L utilising human resources", Prentice Hall of India Pv1. Ltd., New Delhi, 1996.
6. Robbins (4th ed.), "Essentials of organizational behavior", Prentice Hall of India Pv1. Ltd., New Delhi, 1995.
7. Luthans Fred., "Organizational Behavior", McGraw Hill, 1998.

CS-605(2)

GRAPH THEORY

Unit -I

Graphs, Sub graphs, some basic properties, various example of graphs & their sub graphs, walks, path & circuits, connected graphs, disconnected graphs and component, euler graphs, various operation on graphs, Hamiltonian paths and circuits, the traveling sales man problem.

Unit- II

Trees and fundamental circuits, distance diameters, radius and pendent vertices, rooted and binary trees, counting trees, spanning trees, fundamental circuits, finding all spanning trees of a graph and a weighted graph, algorithms of primes, Kruskal and dijkstra Algorithms.

Unit -III

Cuts sets and cut vertices, some properties, all cut sets in a graph, fundamental circuits and cut sets , connectivity and separability, network flows, planer graphs, combinatorial and geometric dual, Kuratowski to graphs detection of planarity, geometric dual , some more criterion of planarity, thickness and crossings.

Unit -IV

Vector space of a graph and vectors, basis vector, cut set vector, circuit vector, circuit and cut set verses subspaces, orthogonal vectors and subspaces, incidence matrix of graph, sub matrices of A(G), circuit matrix, cut set matrix, path matrix and relationships among A_f, B_f, and C_f, fundamental circuit matrix and rank of B, adjacency matrices, rank- nullity theorem .

Unit -V

Coloring and covering and partitioning of a graph, chromatic number, chromatic partitioning, chromatic polynomials, matching, covering, four color problem, Directed graphs, some type of directed graphs, Directed paths, and connectedness, Euler digraphs, trees with directed edges, fundamental circuits in digraph, matrices A, B and C of digraphs adjacency matrix of a digraph,, enumeration, types of enumeration, counting of labeled and unlabeled trees, polya's theorem, graph enumeration with polya's theorem.

Graph theoretic algorithm must be provided wherever required to solve the problems .

References:-

1. Deo, N: Graph theory, PHI
2. Harary, F: Graph Theory, Narosa
3. Bondy and Murthy: Graph theory and application. Addison Wesley.

CS-605(3)

PROBABILITY & STOCHASTIC PROCESS

Unit-I
Introduction: Probability models, Algebra of events, probability axioms, conditional probability, Baye's rules, Bernoulli traits.
Discrete Random Variables: Discrete random variables, probability mass functions, discrete distribution functions-Bernoulli, Binomial, geometric, Poisson, hyper geometric & uniform distributions, probability generating function.

Unit-II
Continuous Random variable: Exponential distribution, memory less property, application to reliability, hypo exponential, Erlang, Gamma, hyper exponential & Normal distributions ,order statistics, distribution of sums.

Unit III
Expectation: Expectation, variance, moments of important distribution, Expectation of functions of more than one random variable, Application to the computation of MTTF of series system parallel system, standby redundancy, TMR & NMR system.

Unit IV
Stochastic process: classification of stochastic process, Markov process, Bernoulli process, Poisson process , renewal processes.
Discrete Parameter Markov Chains: Computation of n-step transition probability, state classification & limiting distribution of times between state changes irreducible finite chains with aperiodic states, discrete parameter birth-death processes, Analysis of program execution time, M|G|1 , Queue, pollackek-khinchin formula.

Unit-V
Continuous parameter Markov chains
Birth & death process, M|M|1 Queue, M|M|m Queue, cyclic Queuing model of a multiprogramming system, Machine repairman model, computation of response time in a terminal oriented system. Queuing system with finite populations.
Networks of queues: Introductory concept of open & closed queuing networks.

References:
1 P.K.S Trivedi,-Probability and Statistics with reliability,
   Queuing and computer science applications, PHI, New Delhi
2 Hisashi Kobayashi: Modeling and Analysis-An Introduction to system performance Evalution Methodology," Addison Wesley
3 W.feller-An introduction to probability theory & its application (vol1.)(John Wiley & sons, NY.)
4 U.N.Bhat-Elements of applied stochastic processes, John Wiley & sons, NY.

CS-651
OPERATING SYSTEMS LAB

1. Simulation of the scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority.
2. Simulation of MUTEX and SEMAPHORES.
3. Simulation of Banker's deadlock Avoidance and Prevention Algorithms.
4. Implementation of Process Synchronizations (Reader's-Writer's, Sleeping Barber, and Dining Philosopher's Problem).
5. Simulation of Page replacement algorithms a) FIFO b) LRU c) LFU
6. Simulation of Paging Techniques of memory management.
7. Simulation of file allocation strategies a) Sequential b) Index c) Linked
8. Simulation of organization techniques a) Single level Directory b) Two level c) Hierarchical d) DAG

CS-652
Computer Network Lab

1. Implementation of sender and receiver for testing of connection between two.
2. Implementation of one program on socket programming
3. Implementation of Simplex Protocol with noisy channel
4. Implementation of sliding window protocol
5. Implementation of any one protocol of application layer
6. Implementation of any one protocol of network layer
7. Implementation of RSA Algorithm for encryption and decryption
8. Implementation of DSA Algorithm for encryption and decryption

CS-653
Artificial Intelligent Lab
1. Write a LISP program to solve water-jag problem using heuristic function.
2. Create a compound object using Prolog.
3. Write a Prolog program to show advantage and disadvantage of green and red cuts.
4. Write a Prolog program to use BEST FIRST SEARCH applied to the 8-puzzle problem.
5. Implement SLEEPEST ASCENT HILL CLIMBING using LISP.
6. Implement COUNT PROPAGATION NETWORK using Prolog.
7. Implement a) Forward chaining b) Backward chaining c) Problem Reduction.

STUDY & EVALUATION SCHEME
B. Tech Computer Engineering

SL No.	Course No.	Subjects	Periods			Evaluation Scheme				Subject Total
						Sessional			Examination	
		Theory	L	T	P	CA	TA	Total		
1.	CS-701	Web Technology	3	1	0	30	20	50	100	150
2.	CS-702	Digital Image Processing	3	1	0	30	20	50	100	150
3.	CS-703	Elective-II*	3	1	0	30	20	50	100	150
4.	CS-704	Elective-III*	3	1	0	30	20	50	100	150
5.	CS-705	Open Elective	3	1	0	30	20	50	100	150
		Practical/Training/Project								
6.	CS-751	Web Technology Lab	0	0	2	-	20	20	30	50
7.	CS-752	Digital Image Processing Lab	0	0	2	-	20	20	30	50
8.	CS-753	Colloquium & Industrial Report	0	0	2	-	20	20	30	50
9.	CS-754	Project	0	0	2	-	20	20	30	50
10.	GP-701	General Proficiency	-	-	-	-	-	50	50	50
		Total	15	5	8					1000

- **Elective II-** Choose anyone from the followings (Computational Geometry, Computational Complexity, Parallel algorithms, **Cryptography and Network Security**)
- **Elective III-** Choose anyone from the followings (**Data Mining & Data Warehousing**, Distributed Databases, Bio-informatics, Service oriented Architecture)
- **Open Elective-** Human Computer Interaction, Introduction to value education, **I.T. in business**

CS-701
WEB TECHNOLOGY

UNIT I: Introduction and Web Development Strategies
History of Web, Protocols governing Web, Creating Websites for individual and Corporate World, Cyber Laws, Web Applications, Writing Web Projects, Identification of Objects, Target Users, Web Team, Planning and Process Development.

UNIT II: HTML, XML and Scripting
List, Tables, Images, Forms, Frames, CSS Document type definition, XML schemes, Object Models, Presenting XML, Using XML Processors: DOM and SAX, Introduction to Java Script, Object in Java Script, Dynamic HTML with Java Script.

UNIT III: Java Beans and Web Servers
Introduction to Java Beans, Advantage, Properties, BDK, Introduction to EJB, Java Beans API.

Introduction to Servelets, Lifecycle, JSDK, Servlet API, Servlet Packages: HTTP package, Working with Http request and response, Security Issues.

UNIT IV: JSP
Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects, Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharing data between JSP pages- Sharing Session and Application Data.

UNIT V: Database Connectivity
Database Programming using JDBC, Studying Javax.sql.*package, accessing a database from a JSP page, Application-specific Database Action, Developing Java Beans in a JSP page, Introduction to Struts framework.

Textbooks:
1. Burdman, "Collaborative Web Development" Addison Wesley.
2. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech
3. Joel Sklar , "Principal of web Design" Vikash and Thomas Learning
4. Horstmann, "CoreJava", Addison Wesley.
5. Herbert Schieldt, "The Complete Reference:Java", TMH.
6. Hans Bergsten, "Java Server Pages", SPD O'Reilly

CS-702
Digital Image Processing

UNIT-I

Introduction and Fundamentals

Motivation and Perspective, Applications, Components of Image Processing System, Element of
Visual Perception, A Simple Image Model, Sampling and Quantization.

Image Enhancement in Spatial Domain

Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching;
Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic
Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered
Statistic Filter; Sharpening – The Laplacian.

UNIT-2

Image Enhancement in Frequency Domain

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-
pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters
– Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic
Filtering.

Image Restoration

A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering –
Mean Filters : Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and
Min filters ; Periodic Noise Reduction by Frequency Domain Filtering –Bandpass Filters ; Minimum Mean-
square Error Restoration

UNIT-3

Color Image Processing

Color Fundamentals, Color Models, Converting Colors to different models, Color Transformation, Smoothing and
Sharpening, Color Segmentation.

Morphological Image Processing

Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing,
Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex
Hull, Thinning, Thickening

UNIT-4

Registration

Introduction, Geometric Transformation – Plane-to-Plane transformation, Mapping, Stereo Imaging – Algorithms
to Establish Correspondence, Algorithms to Recover Depth

Segmentation

Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-
based Approach. Edge and Line Detection : Edge Detection, Edge Operators, Pattern Fitting Approach, Edge
Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line
Detection, Corner Detection.

UNIT-5

Feature Extraction

Representation, Topological Attributes, Geometric Attributes

Description

Boundary-based Description, Region-based Description, Relationship.

Object Recognition

Deterministic Methods, Clustering, Statistical Classification, Syntactic Recognition, Tree Search,
Graph Matching

Text Books

1) Digital Image Processing 2nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson ducation
2) Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.
3) Fundamentals of Digital Image Processing, A.K. Jain. Published by Prentice Hall, Upper Saddle River, NJ.

CS-703(1)
COMPUTATIONAL GEOMETRY

UNIT 1
Convex hulls: construction in 2d and 3d, lower bounds; Triangulations: polygon triangulations, representations, point-set triangulations, planar graphs;

UNIT 2
Voronoi diagrams: construction and applications, variants; Delayney triangulations: divide-and-conquer, flip and incremental algorithms, duality of Voronoi diagrams, minmax angle properties;

UNIT 3
Geometric searching: point-location, fractional cascading, linear programming with prune and search, finger trees, concatenable queues, segment trees, interval trees; Visibility: algorithms for weak and strong visibility, visibility with reflections, art-gallery problems;

UNIT 4
Arrangements of lines: arrangements of hyper planes, zone theorems, many-faces complexity and algorithms; Combinatorial geometry: Ham-sandwich cuts

UNIT 5
Sweep techniques: plane sweep for segment intersections, Fortune's sweep for Voronoi diagrams, topological sweep for line arrangements; Randomization in computational geometry: algorithms, techniques for counting; Robust geometric computing; Applications of computational geometry;

Books:
1 *Computational Geometry: An Introduction* by Franco P. Preparata and Michael Ian Shamos; SpringerVerlag, 1985
2 *Computational Geometry, Algorithms and Applications*. by Mark de Berg, Marc van Kreveld, Mark Overmars, and Otfried Schwarzkopf; SpringerVerlag, 1997. from Springer.
3 *Algorithmische Geometrie* (auf deutsch) by Rolf Klein Addison-Wesley, 1996
4 *Computational Geometry and Computer Graphics in C++* by Michael J. Laszlo (Nova Southeastern University) Prentice-Hall, 1996.
5 *Computational Geometry: An Introduction Through Randomized Algorithms* by Ketan Mulmuley Prentice-Hall, 1994
6 *Computational Geometry in C* by Joseph O'Rourke Cambridge University Press, second edition, 1998
7 Source code (in both C and Java) and errata
   a) Computational Geometry applet illustrating several pieces of code from the book
   b) Information about the first edition is still available.

CS-703(2)
COMPUTATIONAL COMPLEXITY

UNIT 1
Models of Computation, resources (time and space), algorithms, computability, complexity;

UNIT 2
Complexity classes, P/NP/PSPACE, reductions, hardness, completeness, hierarchy, relationships between complexity classes

UNIT 3
Randomized computation and complexity; Logical characterizations, incompleteness; Approximability

Unit 4
Circuit complexity, lower bounds; Parallel computation and complexity; Counting problems; Interactive proofs;

Unit 5
Probabilistically checkable proofs; Communication complexity; Quantum computation

Books:
1 Combinatorial Optimization: Algorithms and Complexity (Hardcover) by Christos H. Papadimitriou
2 Complexity Theory: A Modern Approach Sanjeev Arora and Boaz Barak
3 Computability and Complexity Theory (Texts in Computer Science) (Hardcover) by Steven Homer (Author), Alan L. Selman (Author) Publisher: Springer; 1 edition

CS-703(3)
PARALLEL ALGORITHMS

Unit 1:
Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.

Unit 2:
Performance Measures of Parallel Algorithms , speed-up and efficiency of PA , Costoptimality, An example of illustrate Cost-optimal algorithms- such as summation, Min/Max on various models.

Unit 3:
Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC/, and Parallel Sorting Networks on CREW/EREW/MCC/, linear array

Unit 4:
Parallel Searching Algorithm, K^{th} element, K^{th} element in X+Y on PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

Unit 5:
Graph Algorithms - Connected Graphs, search and traversal, Combinatorial Algorithms-Permutation, Combinations, Derangements.

Books:
1. M.J. Quinn, "Designing Efficient Algorithms for Parallel Computer" by Mc Graw Hill.
2. S.G. Akl, "Design and Analysis of Parallel Algorithms"
3. S.G. Akl, "Parallel Sorting Algorithm" by Academic Press

CS-703(4)
Cryptography and Network Security

Unit-1

Introduction to security attacks, services and mechanisms, Introduction to cryptography.

Conventional Encryption: Conventional to cryptography model, classical encryption techniques- substution ciphers and transposition ciphers, cryptanalysis, stereography, stream and block cipher.

Modem block ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standards(DES), strength of DES, Differential and linear cryptanalysis of DES, Block cipher modes of operation, Triple DES, IDEA encryption and Decryption, strength of IDEA, Confidentiality using conventional encryption, traffic confidentiality, key distribution, random number generation.

Unit-2

Introduction to graph, ring and field, prime and relative prime numbers, modular arithmetic, Fermat's & Euler's theorem, primality testing, euclid's algorithm, Chinese remainder theorem, discrete logarithms. Principle of public key cryptosystems, RSA algorithm, security of RSA, key management, Diffle Hellman key exchange algorithms, Introductory idea if Elliptic curve cryptography, Elganal Encryption.

Unit-3

Message Authentication & Hash functions: Authentication requirements, Authentication functions, message Authentication codes, Hash functions, Birthday attacks, Security of hash function & MACS, MD5 message digest algorithms, Secure hash algorithm(SHA).

Digital signatures: Digital signatures, Authentication protocol, Digital signatures Standards(DSS), proof of Digital signatures algorithm.

Unit-4

Authentication Applications: Kerberos & X.509, Directory authentication service, Electronic Mail Security Pretty Good Privacy(PGP), S/MIME.

Unit-5

IP Security: Architecture, Authentication Header, Encapsulation security payloads, Combining security associations, Key management.

Web Security: Secure socket layer & Transport Layer Security, Secure Electronic Transaction (SET).

System Security: Intruders, Viruses & related threats, Firewall design principles, Trusted systems.

Reference:
1. William Stalling, "Cryptography and Network Security: Principles and Practice", Prentice Hall, New Jersey.
2. Johannes A. Buchman, "Introduction to Cryptography", SpringerVerlag.

CS-704(1)
DATA MINING & DATA WAREHOUSING

Unit-I: Introduction
Review of basic concepts of data warehousing and data mining, reasons for
their use, benefits and problems arising.

Unit-II: Data Warehouse Design
Data warehouse logical design: star schemas, fact tables, dimensions, other
schemas, materialized, views, Data warehouse physical design: hardware
and i/o considerations, parallelism, indexes.

Unit-III: Data Warehouse Implementation
Data warehousing technologies and implementations: data extraction,
transportation, transformation, loading and refreshing. Data warehouse
support in SQL Server 2000 and Oracle 9i.

Unit- IV: Data Mining
From data warehousing to data mining: OLAP architectures, design and
query processing. SQL, extensions for OLAP.

Unit-V: Data Mining Approaches
Data mining approaches and methods: concept description, classification,
association rules, clustering, Mining complex types of data, Research trends
in data warehousing and data mining.

Books:
1   Data Mining - Concepts and Techniques by Jiawei Han and Micheline Kamber, Morgan
    Kaufmann 2006.
2   Data Mining: Practical Machine Learning Tools and Techniques with Java Implementations by
    Ian H. Witten and Eibe Frank, Morgan Kaufmann 2000.
3   Data Mining: Introductory and Advanced Topics by Margaret Dunham, Prentice Hall 2003.
4   Data Mining with Microsoft SQL Server 2000 Technical Reference Microsoft Press.

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CS-704(2)
Distributed Databases

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Unit-I: Introduction
Architecture of distributed systems: A detailed review of distributed system architecture (network operating system, distributed operating systems, etc.) will be presented leading to distributed database systems. This will then be categorized into (a) federated database systems, (b) multi-database systems, and (c) Client/Server systems.
Advanced transaction model: For managing data processing on distributed platform the conventional transaction model needs some improvements. Discussion of some advanced transaction models suitable for different types of distributed database systems.

Unit-II: Workflow
It is a unit of business processing. From conventional viewpoint it is a set of tightly linked atomic processing units which requires special concurrency control and commit protocols. Discussion of existing ways of handling workflows.

Unit-III: Query processing and Optimization: On distributed systems a query may be fragmented for processing on multiple nodes. This give rise to the problem of query fragmentation and distribution which must be addressed for improving performance.

Unit-IV: Application distribution: To support parallel and concurrent processing of transactions processing application have to be distributed. This gives rise to application recovery problem. This course will explore new ways of managing application recovery which is more complex than database recovery.

Unit-V: Transaction management, commit protocol and database recovery: These are system related issues. We will discuss commonly used schemes and advanced protocols for managing these activities.

Buffer management: Database maintains their own buffer for processing transactions.

Books:
1. Distributed Systems: Concept and Design. Coulouris, Dollimore, and Kindberg. AW.
2. Distributed Database Principles and Systems. Ceri and Pelagatti. McGraw Hill.
3. Recovery Mechanisms in Database Systems. Kumar and Hsu, Prentice Hall.
4. Concurrency Control and Recovery in Database Systems. Bernstein, Hadzilacos and Goodman, AW.

CS-704(3)
Bioinformatics

Unit I: Introduction
Bioinformatics objectives and overviews, Interdisciplinary nature of Bioinformatics, Data integration, Data analysis, Major Bioinformatics databases and tools. Metadata: Summary & reference systems, finding new type of data online.
Molecular Biology and Bioinformatics: Systems approach in biology,Central dogma of molecular biology, problems in molecular approach and the bioinformatics approach, Overview of the bioinformatics applications.

Unit II: The Information Molecules and Information Flow
Basic chemistry of nucleic acids, Structure of DNA, Structure of RNA, DNA Replication, - Transcription, -Translation, Genes- the functional elements in DNA, Analyzing DNA,DNA sequencing. Proteins: Amino acids, Protein structure, Secondary, Tertiary and Quaternary structure, Protein folding and function, Nucleic acid-Protein interaction.

Unit III: Perl
Perl Basics, Perl applications for bioinformatics- Bioperl, Linux Operating System, Understanding and Using Biological Databases, Java clients, CORBA, Introduction to biostatics.

Unit IV: Nucleotide sequence data
Genome, Genomic sequencing, expressed sequence tags, gene expression, transcription factor binding sites and single nucleotide polymorphism. Computational representations of molecular biological data storage techniques: databases (flat, relational and object oriented), and controlled vocabularies, general data retrieval techniques: indices, Boolean search, fuzzy search and neighboring, application to biological data warehouses.

Unit V: Biological data types and their special requirements: sequences, macromolecular structures, chemical compounds, generic variability and its connection to clinical data. Representation of patterns and relationships: alignments, regular expressions, hierarchies and graphical models.

Books:
1. O'Reilly, " Developing Bio informatics computer skills", Indian Edition's publication
2. Rastogi, Mendiratta, Rastogi, "Bioinformatics concepts, skills & Applications", CBS Publishers
3. Rashidi, Hooman and Lukas K. Buehler, "Bioinformatics Basic Applications" CRC Press.
4**.** "Bioinformatics" , Addison Wesley
5. Stephen Misner & Stephen Krawetz, " Bioinformatics- Methods & Protocols"

CS-704(4)
Service Oriented Architecture

Unit I: Introduction
What is service oriented architecture? Elements of SOA, The evolution of SOA, Introduce the concepts of services and SOA, Design principles of SOA, The relationship between SOA and web services, advantages and risks of SOA.
Service Oriented Methodology: Services, General Model of Services, Service Lifecycle, Service oriented analysis, Service oriented design, Introduction to service oriented patterns **SOA Past and Present:** From XML to Web Service to SOA, How SOA was done before, Emerging standards for SOA, Compare SOA with other architectures.

Unit II: Introduction to Business Process
How a collection of services perform a task, Simple request response interaction, Complex interaction involving many services, Need for a coordinator service emerge, Birth of orchestration or business process, Composing processes using processes, Business Process Execution Language (BPEL), Example business processes

Unit III: Service Enablement
Basic web services elements, Core web services standards stack, Basic concepts of service orientation
Simple Object Access Protocol (SOAP): Objectives, SOAP Overview, Why do you need SOAP?, SOAP In Protocol Stack, Header Attributes, SOAP Body, SOAP Fault, Document/Literal Style, Document/Literal Wrapped Style, Details of the Wrapped Style

Unit IV: Distributing Services Across a Network
Aligning functional and nonfunctional requirements, The role of Intermediaries In Service Networks, Introductions to WS-* Extensions, SOA Tenets.
A Service Oriented Reference Model: Reference models and reference architectures, The IMPACT SOA reference model and architecture, SOA vendors and their relationship with SOA, SOA support in .NET and J2EE platforms,
Layered Architecture: What is layering and why we need them? The layers pattern, Classic three-layer architecture, Connecting to the domain layer, Linking to the User interface, Using packages to decompose a system, Avoiding mutual dependencies,
Application service layer, Business service layer, Orchestration service layer

Unit V: Software Platform for SOA
Software Tools for SOA, The Need for a Tool, SOA Development Life Cycle, Oracle BP Manager, Microsoft BizTalk Server 2006, Rational Application Developer (RAD) Key Features, Web Services Support, Runtime Products for SOA.

Books:
1) Thomas Erl, "Service-Oriented Architecture (SOA): Concepts, Technology, and Design", The Prentice Hall
2) Dirk Krafzig, Karl Banke, Dirk Slama, "Enterprise SOA: Service-Oriented Architecture Best Practices" (The Coad Series)
3) Eric A. Mark, Michael Bell, "Service-Oriented Architecture (SOA): A Planning and Implementation Guide for Business and Technology".

CS-705(5)
Human Computer Interaction

Unit-1
User centered design of system & interfaces, anatomy and rational of WIMP (Window, Icon, Menus & Pointing Devices) interfaces.

Unit-2
Dialogue design, Presentation Design, user documentation, evaluation/usability testing of user interface.

Unit-3
Ergonomics   Cognitive issues, hypertext and the World Wide Web.

Unit-4
User centered design, human factors in User centered-design, development and evaluation, Interactive design rapid prototyping.

Unit-5
Designing for usability effectiveness, learn ability, flexibility, attitude and usability goals, criteria for acceptability.

References:
1   Suifte AG, "Human Computer Interface Design", 2nd ed, Macmillan
2   Sheiderman B Designing the user Interface, "Strategies for Effective Human-Computer Interaction" 2nd ed. Addision Wesley

CS-705(5)
IT in Business

Unit-1
Business Drivers IT's Competitive potential
Strategic alignment
Strategic Management and Competitive Strategy

Unit-2
Rethinking Business thought IT developing a competitive Strategy
Inter organization Information System, Business to Business Systems
e-Commerce and Market System, Introduction of m-Commerce

Unit-3
Forming of corporate IT Strategies, Developing an Information Architecture

Unit-4
Incorporating Business innovation into the corporate IT Strategy
The changing role of IT in Inter national Business
The changing the global IT practices

Unit-5
The impact and value of IT in competitive Strategy
Changing the focus of Strategy
Trends beyond 2000.

References
1. Callon Jack D." Competitive advantage through Information Technology" McGraw-Hill
2. Tapscott, Don " The Digital Economy" McGraw-Hill

CS-751
Web Technology Lab

1. Write HTML / Java scripts to display your CV in Web Brower.
2. Creating and annotation of static web pages using any HTML editor.
3. Write a program to use XML and JavaScript for creation of your homepage.
4. Write a program in XML for creation of DTD which specifies a particular set of rules.
5. Create a style sheet in CSS / XSL and display the document in web browser.
6. Write a Java Servelet for HTTP Proxy Server.
7. Use JSP pages for sharing session and application data of HTTP Server.
8. Write a program to use JDBC connectivity program for maintaining database by sending queries.

CS-752
Digital Image Processing Lab

1. Implement the spatial image enhancement function on a bit map image-
   a) Mirroring (Inversion)   b) Rotation (Clockwise)   c) Enlargement (Double size)
2. Implement   a) Low Pass Filter   b) High Pass Filter
3. Implement   a) Arithmetic Mean Filter   b) Geometric Mean Filter
4. Implement Smoothing and sharpening of an 8-bit color image.
5. Implement   a) Boundary Extraction Algorithm   b) Graham's Scan Algorithm.
6. Implement   a) Edge Detection   b) Line Detection.

STUDY & EVALUATION SCHEME
B. Tech Computer Engineering

Year 4th,
Semester-VIII

SL No.	Course No.	Subjects	Periods			Evaluation Scheme				Subject Total
						Sessional			Examination	
		Theory	L	T	P	CA	TA	Total		
1.	CS-801	Distributed System	3	1	0	30	20	50	100	150
2.	CS-802	Advance Computer Architecture	3	1	0	30	20	50	100	150
3.	CS-803	Elective-IV*	3	1	0	30	20	50	100	150
4.	CS-804	Elective-V**	3	1	0	30	20	50	100	150
		Practical/Training/Project								
5.	CS-851	Distributed System Lab	0	0	2	-	20	20	30	50
6.	CS-852	Advance Computer Architecture Lab	0	0	2	-	20	20	30	50
7.	CS-853	Project	0	0	4	-	100	100	100	200
8.	CS-854	Project	0	0	2	-	20	20	30	50
9.	GP-801	General Proficiency	-	-	-	-	-	50	50	50
		Total	15	5	8					1000

Elective-IV * Chosen anyone from the followings (Real Time Systems, **Software Project management**, Software Quality Engineering)

Elective-V ** Chosen anyone from the followings (Neural Networks, Fuzzy Systems, Natural Language Processing, **Mobile Computing**)

DISTRIBUTED SYSTEMS (CS-801)

Unit –I

Characterization of Distributed Systems: Introduction, Examples of distributed systems, Resource sharing and the Web Challenges.

System Models: Architectural models, Fundamental Models

Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, global state, termination detection.

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Unit –II

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Unit –III

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study.

Security: Overview of security techniques, Cryptographic algorithms, Digital signatures Cryptography pragmatics, Case studies: Needham Schroeder, Kerberos, SSL & Millicent.

Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System, Recent advances.

Unit –IV

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault -tolerant services, highly available services, Transactions with replicated data.

Unit –V

Distributed Algorithms: Introduction to communication protocols, Balanced sliding window protocol, Routing algorithms, Destination based routing, APP problem, Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm.

CORBA Case Study: CORBA RMI, CORBA services.

Books:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Coulouris, Doll more, Kindberg, "Distributed System: Concepts and Design", Pearson Ed.
3. Gerald Tel, "Distributed Algorithms", Cambridge University Press

ADVANCE COMPUTER ARCHITECTURE (CS-802)

Unit – I Introduction:
Introduction to parallel computing, need for parallel computing, parallel architectural classification chemes, Flynn's , Fengs classification, performance of parallel processors, distributed processing, processor and memory hierarchy, bus, cache & shared memory, introduction to super scalar architectures, quantitative evaluation of performance gain using memory, cache miss/hits.

Unit – II Multi-core architectures:
Introduction to multi-core architectures, issues involved into writing code for multi-core architectures, evelopment of programs for these architectures, program optimizations techniques, building of some of these techniques in compilers, OpenMP and other message passing libraries, threads, mutex etc.

Unit – III Multi-threaded architectures:
Parallel computers, Instruction level parallelism (ILP) vs. thread level parallelism (TLP), Performance issues: Brief introduction to cache hierarchy and communication latency, Shared memory ultiprocessors, General architectures and the problem of cache coherence, Synchronization primitives: Atomic primitives; locks: TTS, ticket, array; barriers: central and tree; performance implications in shared memory programs; Chip multiprocessors: Why CMP (Moore's law, wire delay); shared L2 vs. tiled CMP; core complexity; power/performance; Snoopy coherence: invalidate vs. update, MSI, MESI, MOESI, MOSI; performance trade-offs; pipelined snoopy bus design; Memory consistency models: SC, PC, TSO, PSO, WO/WC, RC; Chip multiprocessor case studies: Intel Montecito and dual-core, Pentium4, IBM Power4, Sun Niagara

Unit – IV Compiler optimization issues:
Introduction to optimization, overview of parallelization; Shared memory programming, introduction to OpenMP; Dataflow analysis, pointer analysis, alias analysis; Data dependence analysis, solving data dependence equations (integer linear programming problem); Loop optimizations; Memory hierarchy issues in code optimization.

Unit –V Operating system issues and applications:
Operating System issues for multiprocessing Need for pre-emptive OS; Scheduling Techniques, Usual OS scheduling techniques, Threads, Distributed scheduler, Multiprocessor scheduling, Gang scheduling; Communication between processes, Message boxes, Shared memory; Sharing issues and Synchronization, Sharing memory and other structures, Sharing I/O devices, Distributed Semaphores, monitors, spin-locks, Implementation techniques on multi-cores; OpenMP, MPI and case studies Case studies from Applications: Digital Signal Processing, Image processing, Speech processing.

Books :
1. Hwang, " Advanced Computer Architecture", New Age International
2. Quin, " Parallel Computing, Theory & Practices", McGraw Hill

CS-803 (1)
REAL TIME SYSTEMS

UNIT-I: Introduction
Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

UNIT-II: Real Time Scheduling
Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems.

UNIT-III: Resources Access Control
Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects.

UNIT-IV: Multiprocessor System Environment
Multiprocessor and Distributed System Model, Multiprocessor Priority-Ceiling Protocol, Schedulability of Fixed-Priority End-to-End Periodic Tasks, Scheduling Algorithms for End-to-End Periodic Tasks, End-to-End Tasks in Heterogeneous Systems, Predictability and Validation of Dynamic Multiprocessor Systems, Scheduling of Tasks with Temporal Distance Constraints.

UNIT-V: Real Time Communication
Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols, Real Time Protocols, Communication in Multicomputer System, An Overview of Real Time Operating Systems.

Books:
1) Real Time Systems by Jane W. S. Liu, Pearson Education Publication.

2) Real-Time Systems: Scheduling, Analysis, and Verification by Prof. Albert M. K. Cheng, John Wiley and Sons Publications.

CS-803 (2)
SOFTWARE PROJECT MANAGEMENT

UNIT-I: Introduction and Software Project Planning
Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

UNIT-II: Project Organization and Scheduling
Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

UNIT-III: Project Monitoring and Control
Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

UNIT-IV: Software Quality Assurance and Testing
Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance, Cleanroom process.

UNIT-V: Project Management and Project Management Tools
Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

Books:

1) Software Project Management by M. Cotterell
2) Information Technology Project Management
3) Management Information and Control by
4) Software Project Managemnet by S. A. Kelkar

CS-803 (3)
SOFTWARE QUALITY ENGINEERING

UNIT-I: Introduction
Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics.

UNIT-II: Software Quality Metrics
Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators.

UNIT-III: Software Quality Management and Models
Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Reliability Allocation Models, Criteria for Model Evaluation, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

UNIT-IV: Software Quality Assurance
Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes.

UNIT-V: Software Verification, Validation & Testing:
Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

Books:
1) Jeff Tian, Software Quality Engineering (SQE), Wiley-Interscience, 2005; ISBN 0-471-71345-7.
2) Metrics and Models in Software Quality Engineering, Stephen H. Kan, Addison-Wesley (2002), ISBN: 0201729156

CS-804(1)
NATURAL LANGUAGE PROCESSING

Unit-I
Introduction to Natural Language Understanding: The study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English syntax.

Unit-II
Introduction to semantics and knowledge representation, Some applications like machine translation, database interface.

Unit-III
Grammars and Parsing: Grammars and sentence Structure, Top-Down and Bottom-Up Parsers, Transition Network Grammars, Top-Down Chart Parsing. Feature Systems and Augmented Grammars: Basic Feature system for English, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks.

Unit-IV
Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, Movement Phenomenon in Language, Handling questions in Context-Free Grammars. Human preferences in Parsing, Encoding uncertainty, Deterministic Parser.

Unit-V
Ambiguity Resolution: Statistical Methods, Probabilistic Language Processing, Estimating Probabilities, Part-of-Speech tagging, Obtaining Lexical Probabilities, Probabilistic Context-Free Grammars, Best First Parsing. Semantics and Logical Form, Word senses and Ambiguity, Encoding Ambiguity in Logical Form.

Books:
1   Akshar Bharti, Vineet Chaitanya and Rajeev Sangal, *NLP: A Paninian Perspective*, Prentice Hall, New Delhi
2   James Allen, *Natural Language Understanding,* 2/e, Pearson Education, 2003
3   D. Jurafsky, J. H. Martin, *Speech and Language Processing*, Pearson Education, 2002
4   L.M. Ivansca, S. C. Shapiro, *Natural Language Processing and Language Representation*
5   T. Winograd, *Language as a Cognitive Process*, Addison-Wesley

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CS-804(2)
Neural Networks

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Unit-I: Neurocomputing and Neuroscience
Historical notes, human Brain, neuron Model, Knowledge representation, Al and NN. Learning process: Supervised and unsupervised learning, Error correction learning, competitive learning, adaptation, and statistical nature of the learning process.

Unit-II: Data processing
Scaling, normalization, Transformation (FT/FFT), principal component analysis, regression, co-variance matrix, eigen values & eigen vectors. Basic Models of Artificial neurons, activation Functions, aggregation function, single neuron computation, multilayer perceptron, least mean square algorithm, gradient descent rule, nonlinearly separable problems and bench mark problems in NN.

Unit-III
Multilayered network architecture, back propagation algorithm, heuristics for making BP-algorithm performs better. Accelerated learning BP (like recursive least square, quick prop, RPROP algorithm), approximation properties of RBF networks and comparison with multilayer perceptran.

Unit-IV
Recurrent network and temporal feed-forward network, implementation with BP, self organizing map and SOM algorithm, properties of feature map and computer simulation. Principal component and Independent component analysis, application to image and signal processing.

Unit-V
Complex valued NN and complex valued BP, analyticity of activation function, application in 2D information processing. Complexity analysis of network models. Soft computing. Neuro-Fuzzy-genetic algorithm Intergration.

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CS-804(3)
MOBILE COMPUTING

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Unit – I
Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Unit - II
Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Unit – III
Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Unit - IV
Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit – V
Ad Hoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

Books:
1. J. Schiller, Mobile Communications, Addison Wesley.
2. A. Mehrotra , GSM System Engineering.
3. M. V. D. Heijden, M. Taylor, Understanding WAP, Artech House.
4. Charles Perkins, Mobile IP, Addison Wesley.
5. Charles Perkins, Ad hoc Networks, Addison Wesley**.**

CS-804(4)
FUZZY SYSTEMS

UNIT I

Introduction, Basic Types, Basic Concepts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets, Types of Operations. Fuzzy Complements, Fuzzy Intersections: t- Norms., Fuzzy Unions: t-Conorms, Combinations of Operations. Aggregation Operations. Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Fuzzy Equations

UNIT 2

Crisp versus Fuzzy Relations, Projections and Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on a Single Set. Fuzzy Equivalence Relations, Fuzzy Compatibility Relations. Fuzzy Ordering Relations, Fuzzy Morphisms, Sup-i Compositions of Fuzzy Relations., Inf- Compositions of Fuzzy Relations.

UNIT 3

Fuzzy Measures, Fuzzy Sets and Possibility Theory, Classical Logic: An Overview. Multivalued Logics. Fuzzy Propositions. Fuzzy Quantifiers. Linguistic Hedges. Inference from Conditional Fuzzy Propositions. Inference from Conditional and Qualified Propositions. Inference from Quantified Propositions, Information and Uncertainty, Nonspecificity of Fuzzy Sets. Fuzziness of Fuzzy Sets. Principles of Uncertainty

UNIT 4

Fuzzy Expert Systems: An Overview. Fuzzy Implications. Selection of Fuzzy Implications. Multiconditional Approximate Reasoning. The Role of Fuzzy Relation Equations, Fuzzy Controllers: Overview, Fuzzy Neural Networks. Fuzzy Automata. Fuzzy Dynamic Systems.

UNIT 5

Fuzzy Databases. Fuzzy Information Retrieval, Individual Decision Making, Multiperson Decision Making, Multicriteria Decision Making, Multistage Decision Making, Fuzzy Systems and Genetic Algorithms.

Reference:
- George J. Klir, Bo Yuan, "Fuzzy Sets and Fuzzy Logic", PHI
- Witold Pedrvcz and Femando Gomide. "An Introduction to Fuzzy Sets", PHI

CS-851
DISTRIBUTED SYSTEM LAB

1. The design and implementation of RMI using Java.
2. Design and implementation of a sequencer multicast protocol using Java.
3. Design and implementation of a Task Bag Server using CORBA or Java RMI.
4. Use of the UNIX interface to UDP sockets to implement a simple RPC framework in C++.
5. Operating Systems experiments.
6. A prototype for a stateless file server and its cache mechanism.

CS-852
Advance Computer Architecture Lab

The following programs should be developed in '**C**' language preferably on '**UNIX'** platform. Programs (3-7) require usage of Parallel Computing APIs:

1. Write a program to execute three POSIX Threads (PThreads) simultaneously for updating a text file.

2. Write a program for synchronizing POSIX Threads (PThreads) using (a) Semaphore (b) Mutex

3. Implement the PRAM Algorithm for (a) Parallel Reduction (b) Prefix Sums (c) Preorder Tree Traversal

4. Implement Parallel Matrix Multiplication using (a) Row-Column oriented Algorithm (b) Block-Oriented Algorithm

5. Implement Solution of Linear Systems using (a) Gaussian Elimination (b) Jacobi Algorithm

6. Implement (a) Parallel Quick Sort (b) Hyper Quicksort

7. Implement Parallel Fast Fourier Transform Algorithm.