

**NATIONAL INSTITUTE OF TECHNOLOGY NAGALAND
CHUMUKEDIMA, DIMAPUR – 797 103.**

B.Tech Degree Programme

Curriculum and Syllabus

Regulations – 2012

Bachelor of Technology in Computer Science and Engineering

Semester II

Course Code	Course Title	L	T	P	C
SH151	English - II	3	0	0	3
MA151	Engineering Mathematics - II	3	1	0	4
PH151	Engineering Physics - II	3	0	0	3
GE151	Environmental Science and Engineering	3	0	0	3
GE152	Engineering Mechanics	3	1	0	4
CS151	Digital System Fundamentals	3	0	0	3
PH152	Physics Laboratory - II	0	0	2	1
GE153	Workshop	0	0	2	1
CS152	Digital System Laboratory	0	0	3	2
TOTAL		18	2	7	24

FOCUS ON LANGUAGE: VOCABULARY**9**

Technical Vocabulary – Synonyms and antonyms - Different grammatical forms of the same word – Numerical adjectives – Articles – Conjunctions and prepositions – Conjunctions used in adverbial phrases and clauses – Abbreviations and acronyms – Foreign words and phrases.

FOCUS ON LANGUAGE: GRAMMAR**9**

Phrases and structures indicating use and purpose – Cause and effect expressions – Using connectives – Imperative and ‘should’ – Yes/ No question forms – Reported speech – Relative clauses – Adverbial clauses of time, place and manner .

READING**9**

Intensive reading and predicting content – Meanings in context - Reading and interpretation – Critical reading – Creative and critical thinking – Note-making.

WRITING**9**

Paragraph development - Process description – Descriptive writing - Writing analytical paragraphs – Recommendations – Instructions – Checklists - Letter of application – content, format – Writing an essay – Proposals – Report Writing – Types, format, structure, data collection, content, form.

LISTENING AND SPEAKING**9**

Non-verbal communication – Listening – Stress and intonation - Correlating verbal and non- verbal communication – Speaking in group discussions – Discussion of problems and solutions – Oral instructions.

Total: 45 Periods**TEXT BOOKS**

1. Meenakshi Raman and Sangeeta Sharma, “Technical Communication: English Skills for Engineers”, Second Edition, Oxford University Press, 2011.

REFERENCE BOOKS

1. Andrea, J. Rutherford, “Basic Communication Skills for Technology”, Second Edition, Pearson Education, 2007.
2. Pickett, Nell Ann, Ann A.Laster and Katherine E.Staples. “Technical English: Writing, Reading and Speaking”. New York: Longman, 2001.

LAPLACE TRANSFORMS**12**

Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Initial and final value theorems – Inverse Laplace transforms – Convolution theorem – Solution of Ordinary Differential Equations with constant coefficients using Laplace transforms – Transform of periodic functions – Solution of integral equations.

VECTOR CALCULUS**12**

Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Problem solving using Green's theorem, Gauss divergence theorem and Stoke's theorem – Simple applications and verifications.

ANALYTIC FUNCTIONS**12**

Necessary and Sufficient conditions (without proof) – Cauchy-Riemann equations – Properties of analytic functions – Harmonic conjugate – Construction of Analytic functions – Conformal mapping: $w = z+a$, az , $1/z$, Z^2 and bilinear transformation.

MULTIPLE INTEGRALS**12**

Double integration – Cartesian and Polar Co-ordinates – Change of order of integration – Area as a double integral – Change of variables between Cartesian and Polar Co-ordinates – Triple integration – Volume as a triple integral.

COMPLEX INTEGRATION**12**

Problems solving using Cauchy's integral theorem and integral formula – Taylor's and Laurent's expansions – Residues – Cauchy's residue theorem – Contour integration over unit circle – Semicircular contours with no pole on real axis.

Total: 60 Periods**TEXT BOOKS**

1. Grewal, B.S., "Higher Engineering Mathematics", Thirty eighth Edition, Khanna Publishers, New Delhi, 2005.
2. Venkataraman. M. K., "Engineering Mathematics", Volume I and II Revised enlarged Fourth Edition, The National Publishing Company, Chennai, 2004.

REFERENCE BOOKS

1. Glyn James., “Advanced Modern Engineering Mathematics”, Third Edition, Pearson Education Ltd, New Delhi, 2004.
2. Ramana B.V., “Higher Engineering Mathematics”, Tata McGraw Hill, New Delhi, 11th Reprint, 2010.
3. Veerarajan. T., “Engineering Mathematics (for first year)”, Fourth Edition, Tata McGraw– Hill, New Delhi, 2005.
4. Bali N. P and Manish Goyal, “Text book of Engineering Mathematics”, Third edition, Laxmi Publications (P) Ltd., 2008.

BASICS & STATICS OF PARTICLES**12**

Units and Dimensions – Laws of Mechanics – Lamé's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments – Vector operations: additions, subtraction, dot product, cross product – Coplanar Forces – Resolution and Composition of forces – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility – Single equivalent force

EQUILIBRIUM OF RIGID BODIES**12**

Free body diagram – Types of supports and their reactions – requirements of stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Equilibrium of Rigid bodies in two dimensions – Examples

DISTRIBUTED FORCES AND MOMENT OF INERTIA**12**

Line, area and volume distribution of forces – Centre of gravity – Centre of mass – Centroid of plane figure – Centroid of composite figure – Area and mass moments of inertia – Principal axes of inertia – Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia – Principal moments of inertia of plane areas – Derivation of mass moment of inertia for rectangular section, prism, sphere from first principle – Relation to area moments of inertia – Radius of gyration

DYNAMICS OF PARTICLES**12****Kinematics of Particles:**

Differential equations of kinematics – plane – rectilinear and curvilinear motions – Cartesian co-ordinate system – Normal and tangent co-ordinate system – projectile motion

Kinetics of Particles:

Newton's second law of motion – Work and energy principle – gravitational potential energy – elastic potential energy – kinetic energy – power – efficiency – Principle of impulse and momentum – Impact motion – direct central impact

Frictional force – Laws of Coloumb friction – Dry friction – simple contact friction – Co-efficient of friction – Rolling resistance - Translation of a rigid body in a plane - Kinematics of rotation and plane motion – Kinetics of rotation and plane motion - equation of motion – principle of work and energy – Principle of impulse and momentum

Total: 60 Periods

TEXT BOOKS

1. S. Timoshenko and D.H. Young, “Engineering Mechanics”, Fourth edition, McGraw-Hill, 1956.
2. Irving H. Shames, “Engineering Mechanics – Statics and Dynamics”, Fourth Edition, Pearson Education Asia Pvt. Ltd., 2003.

REFERENCE BOOKS

1. Beer F.P and Johnson Jr. E.R. “Vector Mechanics for Engineers”, Seventh Edition, McGraw-Hill International Edition, 2003.
2. Hibbeler, R.C., “Engineering Mechanics”, Twelfth Edition, Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., 2010.
3. M.V Seshagiri Rao and D Rama Durgaiah, “Engineering Mechanics” University Press, 2005.
4. K V Natarajan, “Engineering Mechanics”, Dhanalakshmi Publishers, Chennai 2006.

INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 9

Definition – Scope and importance – Need for public awareness – Forest resources – Use and over – Exploitation – Deforestation – Case studies – Timber extraction – Mining – Dams and their ground water – Floods – Drought – Conflicts over water – Dams – Benefits and problems – Mineral resources – Use effects on forests and tribal people – Water resources – Use and over- utilization of surface and exploitation – Environmental effects of extracting and using mineral resources – Case studies – Food resources – World food problems – Changes caused by agriculture and overgrazing – Effects of modern agriculture – Fertilizer – Pesticide problems – Water logging, salinity – Case studies – Energy resources – Growing energy needs – Renewable and non renewable energy sources – Use of alternate energy sources – Case studies – Land resources – Land as a resource – Land degradation – Man induced landslides – Soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles

ECOSYSTEMS AND BIODIVERSITY 9

Concepts of an ecosystem – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (A) forest ecosystem (B) grassland ecosystem (C) desert ecosystem (D) aquatic ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries) – Introduction to biodiversity – Definition genetic, species and ecosystem diversity – 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 and ex-situ conservation of biodiversity

ENVIRONMENTAL POLLUTION 9

Definition – Causes, Effects and Control Measures of:- (A) Air Pollution (B) Water Pollution (C) Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Solid Waste Management:- Causes, Effects and Control Measures of Urban and Industrial Wastes – Role of an Individual in Prevention of Pollution – Pollution Case Studies – disaster Management:- Floods, Earthquake, Cyclone and Landslides

SOCIAL ISSUES AND THE ENVIRONMENT

9

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 – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – Wasteland reclamation – Consumerism and waste products – Environment production act – Air (Prevention and control of pollution) act – Water (Prevention and control of pollution) act – Wildlife protection act – Forest conservation act – Issues involved in enforcement of environmental legislation – Public awareness

HUMAN POPULATION AND THE ENVIRONMENT

9

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 - Field study of local area to document environmental assets – River / Forest / Grassland / Hill / Mountain - Field study of common plants, insects and birds – Field study of simple ecosystems – Pond, river, hill slopes, etc., - Field study of local polluted site – Urban / Rural / Industrial / Agricultural

Total: 45 Periods

TEXT BOOKS

1. Masters, G.M., “Introduction to Environmental Engineering and Science”, 2nd Edition, Pearson Education, 2004
2. Miller, T.G. Jr., “Environmental Science”, Wadsworth Pub. Co.,1971
3. Townsend, C., Harper, J. and Begon, M., “Essentials of Ecology”, Blackwell Science, 2003
4. Trivedi, R.K. and Goel, P.K., “Introduction to Air Pollution”, Techno-Science Publications

REFERENCE BOOKS

1. Erach, B., “The Biodiversity of India”, Mapin Publishing Pvt. Ltd.,
2. Trivedi, R.K., “Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards”, Vol.I and II, Envio Media.

3. Cunningham, Cooper, W.P. and Gorhani, T.H., "Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001.

PH151 ENGINEERING PHYSICS - II

L T P C
3 0 0 3

QUANTUM PHYSICS

9

Difficulties with Classical physics - Introduction to quantum mechanics - Simple concepts - Black Body radiations - Planck's Radiation law, photoelectric effect - Compton effect - Wave particle duality - Wave packets, phase velocity and group velocity - Physical interpretation of wave function - Probabilities and Normalization - Schrodinger wave equations-time dependent and time independent - Expectation value - Ehrenfest Theorem - particle in a one-dimensional box - Potential barrier and tunneling - Linear harmonic oscillator

CONDUCTING MATERIALS

9

Conductors – Classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Kroning-Penny model (qualitative) - E-K diagrams - Brillouin Zones - concept of effective mass and holes - Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – Carrier concentration in metals

SEMICONDUCTING MATERIALS

9

Intrinsic semiconductor – Carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – Electrical conductivity – Band gap determination – Extrinsic semiconductors – Variation of Fermi level with impurity concentration – Compound semiconductors – Hall effect –Determination of Hall coefficient – Photoconductivity in insulating crystal - variation with illumination - effect of traps - application of photoconductivity - photovoltaics cells - solar cell and its characteristics

MAGNETIC AND SUPERCONDUCTING MATERIALS

9

Origin of magnetic moment – Bohr magneton – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – Soft and hard magnetic materials – Anti-ferromagnetic materials – Ferrites – Applications – Magnetic recording and readout – Storage of magnetic data – Tapes, floppy and magnetic disc drives

Superconductivity: Properties - Types of super conductors – BCS theory of superconductivity (Qualitative) - High T_c superconductors – Applications of superconductors – Josephson Effect – Josephson Junction -SQUID, Cryotron, Magnetic levitation

MODERN ENGINEERING MATERIALS

9

Shape memory alloys (SMA): Characteristics , Properties of NiTi alloy, Application, Advantages and disadvantages of SMA

Nanomaterials: Synthesis - concept of quantum size effect - quantum dots and their applications - Properties of nanoparticles and applications - Carbon nanotubes: Structure, Properties and Applications

Total: 45 Periods

TEXT BOOKS

1. Arthur Beiser “ Concepts of Modern Physics” Tata McGraw Hill Publications, 2009.
2. Charles P. Poole and Frank J.Owenn, 'Introduction to Nanotechnology', Wiley India, 2007
3. M.N. Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics', S.Chand and Company, Ltd., New Delhi, 2005

REFERENCE BOOKS

1. Rajendran, V, and Marikani A, 'Materials science' TMH, 2004
2. M. Arumugam, 'Materials Science' Anuradha publications, 2006
3. Charles Kittel ' Introduction to Solid State Physics', John Wiley and sons, 7th Edition, 2007
4. S.O.Pillai , “Solid State Physics” New Age Int. Ltd. Publications, 2010

CS151 DIGITAL SYSTEM FUNDAMENTALS

L T P C
3 0 0 3

BOOLEAN ALGEBRA AND LOGIC GATES

9

Boolean Algebra and Theorems – Boolean Functions – Simplifications of Boolean Functions using Karnaugh Map - Tabulation Methods - Quine McCluskey method – Implementation of Boolean Functions using Logic Gates

COMBINATIONAL LOGIC

9

Combinational Circuits – Analysis and Design Procedures - Circuits for Arithmetic Operations - Code Conversion – Hardware Description Language (HDL)

DESIGN WITH MSI DEVICES

9

Decoders and Encoders – Multiplexers and Demultiplexers – Memory and Programmable Logic – HDL for Combinational Circuits

SYNCHRONOUS SEQUENTIAL LOGIC

9

Sequential Circuits – Flip flops – Analysis and Design Procedures - State Reduction and State assignment – Shift Registers – Counters – HDL for Sequential Circuits

ASYNCHRONOUS SEQUENTIAL LOGIC

9

Analysis and Design of Asynchronous Sequential Circuits - Reduction of State and Flow Tables – Race-Free State Assignment – Hazards – ASM Chart

Total: 45 Periods

TEXT BOOK

1. M. Morris Mano, “Digital Design”, 3rd Edition, Pearson Education, 2007.

REFERENCE BOOKS

1. Charles H. Roth, “Fundamentals of Logic Design”, 5th Edition Thomson Learning, 2003.
2. Raj Kamal, “Digital Systems - Principles and Design”, 2nd Edition, Pearson Education, 2007.

1. Determination of Magnetic Fields of a Bar Magnet and Helmholtz Coil
2. Determination of unknown resistance using Carry Foster bridge
3. Ballistic constant by Half deflection method
4. To Study the electron diffraction and verify the de Broglie equation of matter wave
5. Plot characteristics between reverse saturation current and $10^3/T$ and find out the approximate value of Energy Band Gap in PN junction diode
6. Measurement of Current by potentiometer
7. To study the B-H curve and calculate its parameters: coercivity, saturation magnetization and retentivity
8. To determine the mass susceptibility of a paramagnetic substance by Quinck's method
9. Study current – voltage characteristics, load response, aerial characteristics and spectral response of photo voltaic solar cell
10. Determination of Hall coefficient of semiconductor
11. Band gap set up – using Four Probe method
12. Verification of Bohr's orbital theory through Frank-Hertz experiment

GROUP A (CIVIL AND MECHANICAL)

I. CIVIL ENGINEERING PRACTICE

9

Buildings:

- Study of plumbing and carpentry components of residential and industrial buildings - Safety aspects

Plumbing Works:

- Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings
- Study of pipe connections requirements for pumps and turbines
- Preparation of plumbing line sketches for water supply and sewage works

Hands-on-exercise:

- Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components
- Demonstration of plumbing requirements of high-rise buildings

Carpentry using Power Tools only:

- Study of the joints in roofs, doors, windows and furniture

Hands-on-exercise:

- Wood work, joints by sawing, planing and cutting

II. MECHANICAL ENGINEERING PRACTICE

Welding:

- Preparation of arc welding of butt joints, lap joints and tee joints
- Gas welding practice

Basic Machining:

- Simple turning and Taper turning
- Drilling practice

Sheet Metal Work:

- Forming and Bending
- Model making – Trays, Funnels, etc.
- Different type of joints

Machine assembly practice:

- Study of centrifugal pump
- Study of air conditioner

Demonstration on:

- Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt
- Foundry operations like mould preparation for gear and step cone pulley
- Fitting – Exercises – Preparation of square fitting and vee – fitting models

GROUP B (ELECTRICAL AND ELECTRONICS)**III. ELECTRICAL ENGINEERING PRACTICE**

- Residential house wiring using switches, fuse, indicator, lamp and energy meter
- Fluorescent lamp wiring
- Stair-case wiring
- Measurement of electrical quantities – voltage, current, power and power factor in RLC circuit
- Measurement of energy using single phase energy meter
- Measurement of resistance to earth of an electrical equipment

IV. ELECTRONICS ENGINEERING PRACTICE

- Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CR
- Study of logic gates AND, OR, EOR and NOT
- Generation of Clock Signal
- Soldering practice – Components Devices and Circuits – Using general purpose PCB
- Measurement of ripple factor of HWR and FWR

1. Verification of Boolean Theorems using Digital Logic Gates
2. Design and Implementation of Combinational Circuits using Basic Gates for Arbitrary Functions, Code Converters, etc.
3. Design and Implementation of 4-Bit Binary Adder / Subtractor using Basic Gates and MSI Devices
4. Design and Implementation of Parity Generator / Checker using Basic Gates and MSI Devices
5. Design and Implementation of Magnitude Comparator
6. Design and Implementation of applications using Multiplexers / Demultiplexers
7. Design and Implementation of Shift Registers
8. Design and Implementation of Synchronous and Asynchronous Counters
9. Simulation of Combinational Circuits using Hardware Description Language
10. Simulation of Sequential Circuits using HDL

Department of Computer Science and Engineering

Semester IV

Course Code	Course Title	L	T	P	C
MA251	Numerical Methods	3	1	0	4
CS251	Algorithmics	3	0	0	3
CS252	Microprocessors and Microcontrollers	3	0	0	3
CS253	Web Technology	2	0	2	3
CS254	Operating Systems	3	0	0	3
SH251	Engineering Economics	3	0	0	3
CS255	Algorithmics Laboratory	0	0	3	2
CS256	Microprocessors and Microcontrollers Laboratory	0	0	3	2
CS257	Operating Systems Laboratory	0	0	3	2
TOTAL		17	1	11	25

MA251 NUMERICAL METHODS**L T P C
3 1 0 4****SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 12**

Linear Interpolation Methods (Method of False Position) – Newton's Method – Statement of Fixed Point Theorem – Fixed Point Iteration: $x=G(x)$ Method – Solution of Linear System by Gaussian Elimination and Gauss-Jordon Methods – Iterative Methods: Gauss Jacobi and Gauss-Seidel Methods – Inverse of a Matrix by Gauss Jordon Method – Eigen value of a Matrix by Power Method

INTERPOLATION AND APPROXIMATION 12

Lagrangian Polynomials – Divided differences – Interpolating with a Cubic Spline – Newton's Forward and Backward Difference Formulas – Curve Fitting – Method of Least Squares

NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Derivatives from Difference Tables Divided Differences and Finite Differences – Numerical Integration by Trapezoidal and Simpson's one-third and three-eighth Rules – Romberg's Method – Two and Three Point Gaussian Quadrature Formulas – Double Integrals using Trapezoidal and Simpson's Rules

INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single Step Methods: Taylor Series Method – Euler and Modified Euler Methods – Fourth Order Runge-Kutta Method for Solving First and Second Order Differential Equations – Multistep Methods: Milne's and Adam's Predictor and Corrector Methods

BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12

Finite Difference Solution of Second Order Ordinary Differential Equation – Finite Difference Solution of One Dimensional Heat Equation by Explicit and Implicit Methods – One Dimensional Wave Equation and Two Dimensional Laplace and Poisson Equations

Total: 60 Periods

TEXT BOOK

1. Gerald C.F, and Wheatley, P.O, “Applied Numerical Analysis”, Seventh Edition, Addison-Wesley Publishing, 2004.

REFERENCES

1. Burden R.L and Faires J.D., “Numerical Analysis”, Ninth Edition, Thomson Asia Pvt. Ltd., Singapore, 2002.
2. Ward Cheney E. and David R.Kincaid, “Numerical Mathematics and Computing”, Thomson Brooks / Cole, 2008.

SH251 ENGINEERING ECONOMICS

L T P C
3 0 0 3

BASIC ECONOMICS

9

Economics - Definition – Nature and Scope of Economic Science – Managerial Economics – Basic terms and concepts: goods – utility – value – wealth – factors of production – labour – large scale economics – small scale economics – Law of diminishing marginal utility - Firms: Types, objectives and goals - Managerial decisions - Decision analysis – relation between economic decision and technical decision

DEMAND AND SUPPLY ANALYSIS

9

Demand - Types of demand - Law of demand - demand function - demand forecasting - demand schedule - demand curve - law of demand - elasticity of demand - Types of elasticity - factors determining elasticity - Supply - Supply schedule - Supply curve - Law of supply - Elasticity of supply - time element in the determination of value - market price and normal price - perfect competition - monopoly - monopolistic competition

PRODUCTION AND COST ANALYSIS

9

Production function - Returns to scale - Production optimization - Least cost input - Managerial uses of production function - Cost Concepts - Cost function - Determinants of cost - Estimation of Cost – traditional costing approach – activity base costing - fixed cost – variable cost – marginal cost - Short run and Long run cost curves - Cost Output Decision

PRICING

9

Determinants of Price - Pricing under different objectives and different market structures - Price discrimination - Pricing methods in practice – full cost pricing – marginal cost pricing – going rate pricing – bid pricing – cost benefit analysis – break even analysis – basic assumptions – break even chart – managerial uses of break even analysis

FINANCIAL ACCOUNTING AND CAPITAL BUDGETING

9

Balance sheet and related concepts - Profit & Loss Statement and related concepts - Financial Ratio Analysis - Cash flow analysis - Funds flow analysis - Comparative financial statements - Analysis and Interpretation of financial statements - Investments - Risks and return evaluation of investment decision - Average rate of return - Payback Period - Net Present Value - Internal rate of return.

Total: 45 Periods

TEXT BOOKS

1. Samuelson. Paul A and Nordhaus W.D., “Economics”, Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.
2. McGuigan, Moyer and Harris, “Managerial Economics; Applications, Strategy and Tactics”, Thomson South Western, 10th Edition, 2005, New Delhi, 2007.
3. Prasanna Chandra. “Fundamentals of Financial Management”, Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.

REFERENCE BOOKS

1. Dewett K.K. & Varma J.D., Elementary Economic Theory, S Chand & Co., 2006
2. Barthwal R.R., Industrial Economics - An Introductory Text Book, New Age
3. Khan MY and Jain PK “Financial Management” McGraw-Hill Publishing Co., Ltd
4. Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press.

CS251 ALGORITHMICS

L T P C
3 0 0 3

ALGORITHM ANALYSIS

9

The Role of Algorithms in Computing – Analyzing algorithms – Worst-case and Average-case Analysis - Designing algorithms – Divide-and-Conquer approach - Performance analysis of sorting algorithms - Sorting in linear time - Lower bounds for sorting - Medians and order statistics

MATHEMATICAL FOUNDATIONS

9

Growth of Functions - Big Oh, Small Oh, Omega and Theta notations - Summations - Solving Recurrence equations - The Substitution Method - The Master Method - Generating function techniques - Constructive induction

DESIGN AND ANALYSIS TECHNIQUES

9

Dynamic Programming - Matrix chain multiplication - Elements of Dynamic programming - Longest common subsequence - Greedy Algorithms - Activity selection problem - Elements of the Greedy Strategy - Huffman code – Theoretical foundations for greedy methods – Task scheduling problem

APPLICATIONS

9

Matrix Operations – Solving systems of Linear equations - Simplex algorithm - Standard and Slack forms – Duality - Initial basic feasible solution - String Matching - Naive string-matching algorithm - Knuth-Morris-Pratt algorithm

NP PROBLEMS

9

Probabilistic Analysis - Randomized Algorithms -The Hiring Problem - NP-completeness – reducibility - NP-completeness proofs - Approximation Algorithms - vertex-cover problem – Travelling-salesman problem

Total: 45 Periods

Text Book

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Third Edition, Prentice Hall of India, , 2010.

Reference Books

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 3rd edition, Pearson Education India, 2007.
2. Michael T. Goodrich, R. Tamassia and Mount, Data structures and Algorithms in C++, Wiley student edition, John Wiley and Sons, 2004.
3. S. Sahni, Data Structures, Algorithms and Applications in C++, 2nd Ed., Universities Press, 2005.

CS252 MICROPROCESSORS AND MICROCONTROLLERS **L T P C**
3 0 0 3

MICROPROCESSORS **9**

Intel 8085 Microprocessor – Architecture - Instruction set and Programming - Introduction to 16 Bit Microprocessor - Architecture of 8086 CPU architecture - Internal operations – Instruction set and Programming - Comparison of 8085, 8086 and 8088.

INTERFACING PERIPHERALS WITH MICROPROCESSORS **9**

Programmable peripheral interface (8255A) – USART (8251A) - Keyboard and display controller (8279) - Programmable Interrupt controller (8259) - DMA controller (8257) -Programmable Timer Controller (8254) - Digital to Analog and Analog to Digital Converters

INTEL 8051 MICROCONTROLLER **9**

Intel 8051 architecture – Programming techniques using C and Assembly Instruction set – Timer and counter programming – Serial Port Programming - Interrupt Programming – I/O Port programming - Interfacing with LCD & Keyboard - ADC, DAC - Sensor, External Memory - RTC Interfacing using I²C Standard - LED, LCD and 7 segment display

PIC MICROCONTROLLER **9**

Architecture – Instruction set – Programming techniques using C and Assembly languages - Timers – Capture / Compare / PWM (CCP) Modules - Interrupts – I/O ports – I²C bus for peripheral chip access – A/D converter – USART

APPLICATIONS USING 8051 AND PIC MICROCONTROLLERS **9**

Temperature sensor interfacing - PWM signal generation – PID control of DC motor – Stepper Motor Driver Circuit - Communication between two systems using RF modules

Total: 45 Periods

TEXT BOOKS

1. Ramesh S. Gaonkar, “Microprocessor Architecture Programming and Applications with 8085”, Fourth edition, Prentice Hall, 2002
2. B. B. Bray, The Intel Microprocessors- 8086/8088, 80186, 80286, 80386, and 80486-Architecture, Programming and Interfacing, Prentice Hall, 2000.
3. Kenneth Ayala, “The 8051 Microcontroller”, Third edition, Cengage Learning, 2005
4. John Iovine, ‘PIC Microcontroller Project Book ’, McGraw Hill 2000.
5. Mazidi, Rolin McKinlay, Danny Causey, “PIC Microcontroller and Embedded Systems: using Assembly and C for PIC 18”, Prentice Hall, 2009

REFERENCE BOOKS

1. Walter A-Tribel & Avtar Singh “The 8088 and 8086 Microprocessors programming -Interfacing -software -Hardware and Application”, Fourth Edition, Pearson / PHI, 2003.
2. Douglas V-Hall “Microprocessor and interfacing”, Second Edition, Tata Mc Graw Hill, 2002.
3. Ramesh Gaonkar, “Fundamentals of Microcontrollers and Applications in Embedded Systems with PIC”, Delmar Cengage Learning, 2007.
4. Muhammad Ali Mazidi-Jamice Gillispit Mazidi-“The 8051 micro controller and Embedded System” Pearson Education, 2002.
5. Julio Sanchez Maria P.Canton, “Microcontroller Programming, The Microchip PIC”, CRC Press, Taylor & Francis Group, 2007.

CS253 WEB TECHNOLOGY

L T P C

2 0 2 3

CLIENT SIDE TECHNOLOGIES

9

Web Essentials – Client-Server communication – Markup languages – XHTML – CSS – JavaScript Fundamentals – Evolution of AJAX – AJAX Framework – Web applications with AJAX – AJAX with PHP – AJAX with Databases

SERVER SIDE TECHNOLOGIES

9

Server Side Programming – Handling HTTP request and response – Cookies – Session tracking – Objects – Caching – Using Servlets / JSP / ASP.NET – Java Beans – Enterprise Java Beans

DATABASE CONNECTIVITY

9

Introduction – RDBMS – JDBC Perspectives – ODBC Perspectives – Handling Binary Large Objects – Using Hibernate – Configuration Settings – Mapping persistent classes – Working with persistent objects – Concurrency – Transactions – Caching – Queries for retrieval of objects

XML

9

XML – Namespace – Document Type Definition – XML Schema – Document Object Model – Presenting XML – XSL – Cascading Style Sheets – Using XML Parsers: DOM and SAX

APPLICATION DEVELOPMENT ENVIRONMENT

9

Overview of MVC architecture – Java Server Faces: Features – Components – Tags – Struts: Working principle of Struts – Building model components – View components – Controller components – Forms with Struts – Presentation tags – Developing Web applications – Spring: Framework – Controllers – Developing simple applications

Total: 45 Periods

TEXT BOOKS

1. Jeffrey C. Jackson, “Web Technologies:A Computer Science Perspective”, Pearson Education, 2006.
2. C. Bates, “Web Programming: Building Internet Applications”, Third

Edition, John Wiley & Sons, 2006.

REFERENCE BOOKS

1. Bill Evjen, Kent Sharkey, Thiru Thangarathinam, Michael Kay, Alessandro Vernet, Sam Ferguson, “Professional XML (Programmer to Programmer), First Edition, Wrox Press Inc., 2007..
2. Bryan Basham, Kathy Siegra, Bert Bates, “Head First Servlets and JSP”, Second Edition, O’Reily Media Inc., 2004.
3. Uttam K Roy, “Web Technologies”, Oxford University Press, 2011.
4. Subrahmanyam Allamaraju, Cedric Buest, “Professional Java Server Programming J2EE 1.3 Edition”, Dreamtech Press, 2007.
5. Ralph Moseley, “Developing Web Applications”, Wiley, 2006.

CS254 OPERATING SYSTEMS

L T P C

3 0 0 3

INTRODUCTION

9

Role of Operating System – Evolution of OS – Architecture Support – Notion of process and its states – System Calls – Types of System Calls – System Programs – Interrupts and Context Switch – Virtual Machines – Process concept – Process scheduling – Operations on processes – Interprocess Communication – Communication in Client-Server Systems – Multithreading Models – Threading Issues

PROCESS MANAGEMENT

9

Process Scheduling – Scheduling Criteria – Uniprocessor Scheduling algorithms, Multiprocessor and Real-Time scheduling algorithms – Interprocess Communication and Synchronization – Peterson's solution – Bakery algorithm – Hardware-based solutions – Sempahores – Critical regions – Problems of synchronization – Deadlock System Model – Deadlock Characterization – Methods of Handling Deadlocks – Recovery from Deadlock

MEMORY MANAGEMENT

9

Storage Organizations – Paging – Segmentation – Basics of linking and loading – Demand Paging – Virtual Memory Management – Page replacement algorithms – Belady's anomaly – Thrashing – Working set – Case study of x86 32-bit Memory Management Unit

FILE AND I/O SYSTEMS

9

File concept – Access methods – Directory structure – File-system mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management – Case study of Unix File system and Network File Systems

SECURITY AND PROTECTION

9

Specific and General Protection schemes – Access Control list – Capabilities – Encryption – Case study on Unix, Linux and Windows NT

Total: 45 Periods

TEXT BOOKS

1. Silberschatz, Galvin and Gagne, “Operating System Concepts”, Eighth Edition, John Wiley & Sons Inc., 2009.
2. William Stallings, Operating Systems: Internals and Design Principles, Seventh Edition, Prentice Hall, 2012.

REFERENCE BOOKS

1. Dhananjay M. Dhamdhare, “Operating Systems: A Concept-Based Approach”, Second Edition, McGraw Hill, 2008.
2. Gary Nutt, “Operating Systems”, Third Edition, Addison Wesley, 2003.

Implement the following algorithms using C/ C++ programming language

1. Simple recursive programs like Towers of Hanoi, Generating Permutations
2. Estimating worst-case/average-case complexity of algorithms via programs
3. Randomized quick sort algorithm
4. Merge sort using Divide and Conquer approach
5. Implementation of Strassen's Matrix Multiplication
6. Generation of Huffman code using Greedy Approach
7. Implementation of 8 Queen Problem using Backtracking algorithm
8. Implementation of Floyd's Algorithm using Dynamic Programming
9. Simplex Method
10. Solving the String matching algorithms
11. Study of Benchmarking algorithms
12. Study of Algorithms Tool

**CS256 MICROPROCESSORS AND MICROCONTROLLERS
LABORATORY**

**L T P C
0 0 3 2**

1. Programs for 8/16 Bit Arithmetic Operations: Multi precision addition / subtraction / multiplication / division.
2. Programming with control instructions: Increment / Decrement, Ascending order / Descending order, Maximum / Minimum of numbers, Rotate instructions, Hex / ASCII / BCD code conversions
3. Programs for Sorting and Searching
4. Programs for Digital Clock and Stop Watch
5. Interfacing ADC and DAC
6. Interfacing of 7 segment LED display
7. Traffic Light Controller
8. Interfacing of Relay Circuit
9. Parallel Communication between Two Microprocessor Kits using Mode 1 and Mode 2 of 8255
10. Serial Communication between Two Microprocessor Kits using 8251
11. Demonstration of basic instructions with 8051 / PIC18FXX2 Microcontroller execution, including: Conditional jumps, looping, Calling subroutines and Stack parameter testing
12. Programming using Arithmetic, Logical and Bit Manipulation Instructions of 8051/ PIC18FXX2 Microcontrollers
13. Stepper Motor and DC Motor Speed control using 8085 / 8051
14. Programming and Verifying Timer, Interrupts and UART Operations in PIC18FXX2
15. Communication between 8051 / PIC18FXX2 Microcontroller Kits and PC

CS257 OPERATING SYSTEMS LABORATORY

L T P C

0 0 3 2

1. Basic UNIX commands
2. Shell Programming
3. Familiarization with UNIX system calls for process management and inter-process communication
4. Implementation of Semaphores
5. Experiments on process scheduling and other operating system tasks through simulation/ implementation under a simulated environment (like Nachos , Pintos)
6. Implementation of a file system
7. Implementation of Page Replacement Algorithms
8. Advanced file system implementation

Department of Computer Science and Engineering

Semester VI

Course Code	Course Title	L	T	P	C
CS351	Compiler Design	3	0	0	3
CS352	Software Engineering Principles	3	0	0	3
CS353	Distributed Computing	3	0	0	3
CS354	Service Oriented Architecture	3	0	0	3
CS907	Open Source Systems	3	0	0	3
CS961	Cryptography and Network Security	3	0	0	3
CS355	Compiler Design Laboratory	0	0	3	2
CS356	Service Oriented Architecture Laboratory	0	0	3	2
TOTAL		18	0	6	22

CS351 COMPILER DESIGN

L T P C

3 0 0 3

FRONT END OF COMPILERS

9

The Structure of compiler – Analysis of the Source Program– The phases of compiler – Compiler Construction tools – Lexical analysis – Role of Lexical Analyzer – Input buffering – Specification and Recognition of tokens – A language for specifying lexical analyzer

SYNTAX ANALYSIS AND RUN-TIME ENVIRONMENTS

9

Syntax Analysis – The role of the parser – Context- free Grammars – Writing a grammar – Top Down parsing – Bottom Up parsing – LR Parsers – Constructing SLR and CLR Parsing Tables – Type Checking – Type Systems – Specification of a simple type checker – Run-time Environments – Source language issues – Storage organization – Storage - allocation strategies

INTERMEDIATE CODE GENERATION

9

Syntax Directed definitions – Evaluation order for Syntax Directed definitions – Syntax Directed Translation Scheme - Intermediate languages – Three address code – Syntax Tree – Postfix code - Declarations – Assignment statements – Expression Translation - Back patching

OBJECT CODE GENERATION

9

Issues in code generation – Design of Code Generator - The target machine – Run-time storage management – Basic blocks and flow graphs – Next use information – Register allocation and assignment – The DAG representation of basic blocks – Generating code from DAGS

CODE OPTIMIZATION

9

The principle sources of optimization – Peephole optimization – Optimization of basic blocks – optimal code generation for expressions - Data Flow analysis – Global Data - Code improving transformations – Compiler compilers: YACC – Attributed parser generators

Total: 45 Periods

TEXT BOOKS

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers-Principles, Techniques, and Tools”, Second Edition, Pearson Education, 2008.

REFERENCE BOOKS

1. Randy Allen, Ken Kennedy, “Optimizing Compilers for Modern Architectures: A Dependence-based Approach”, Morgan Kaufmann Publishers, 2002
2. Steven S Muchnik, “Advanced Compiler Design and Implementation” Morgan Kaufmann Publishers – Elsevier Science, Indian Reprint, 2003.
3. Keith D Cooper and Linda Torczon, “Engineering a Compiler”, Morgan Kaufmann Publishers, Elsevier Science, 2004.
4. V.Raghavan, “Principles of Compiler Design”, Tata McGrawHill Education Publishers, 2010.
5. Allen I. Holub, “Compiler Design in C”, Printice-Hall Software Series, 1993.

CS352 SOFTWARE ENGINEERING PRINCIPLES

L T P C

3 0 0 3

BASICS OF SOFTWARE ENGINEERING

9

The nature of Software - Legacy Software - Process models – Generic model - Waterfall model - Incremental Process model – Rapid Application Development model - Evolutionary Process model - Spiral model - Concurrent process - Unified process - Personal and Team process models.

REQUIREMENTS ENGINEERING

9

Need for Requirements Engineering - Planning practice - Modeling practice - Eliciting requirements - Developing Use Cases - Negotiating and validating requirements – Software Prototyping - Data modeling concepts - Flow oriented modeling - Object Oriented Analysis - Functional and Behavioral models.

SOFTWARE ARCHITECTURE AND DESIGN

9

Design process - Design concepts - Architectural Design - Architectural Styles - Validation of Architectural styles - Design and assessment - Component level design – Coupling - Cohesion - Design quality - User Interface Design.

SOFTWARE TESTING

9

Testing strategies - Issues of Conventional and Object Oriented testing - System testing - Art of debugging - Verification and Validation - Testing Conventional and Object-oriented applications.

SOFTWARE QUALITY AND PROJECT MANAGEMENT

9

Software Configuration Management - Metrics for Process, Project and Product - Quality Management - Project Management Concepts - Estimation process - Project scheduling - Risk Management - Software maintenance and Reengineering

Total: 45 Periods

TEXT BOOKS

1. Roger S. Pressman, “Software Engineering: A Practitioner’s Approach”, Seventh Edition, McGraw-Hill International edition, 2010.

REFERENCE BOOKS

1. Ali Behforooz and Frederick J. Hudson, “Software Engineering Fundamentals”, Oxford University Press, 2006.
2. Ian Sommerville, “Software Engineering”, Ninth Edition, Pearson Education, 2008.
3. Shari Lawrence Pfleeger and Joanne M. Atlee ,” Software Engineering: Theory and Practice”, Fourth Edition, Pearson Education, 2010.

COMMUNICATION IN DISTRIBUTED ENVIRONMENT 9

Fundamental – Various Paradigms in Distributed Applications – Remote Procedure Call – Remote Object Invocation – Group Communication – Threads in Distributed Systems – Virtual Machines

DISTRIBUTED OPERATING SYSTEMS 9

Issues in Distributed Operating System – Clock Synchronization – Causal Ordering – Global States – Election Algorithms – Distributed Mutual Exclusion – Distributed Deadlock

DISTRIBUTED RESOURCE MANAGEMENT 9

Distributed Shared Memory – Data-Centric Consistency Models – Distributed Scheduling – VM Scheduling – XEN – Meta scheduling Local Resource Manager – Distributed Load Balancing – Process Migration – Distributed File Systems – Sun NFS – Map Reduce – Hadoop

FAULT TOLERANCE AND CONSENSUS 9

Introduction to Fault Tolerance – Byzantine Fault Tolerance – Impossibilities in Fault Tolerance – Agreement Protocols – Distributed Transactions – Distributed Commit Protocols

CASE STUDIES 9

Distributed Object Based System – CORBA – Distributed Virtualization System – VMware

Total: 45 Periods

TEXT BOOKS

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Addison Wesley, 2011.
2. Hagit Attiya and Jennifer Welch, “Distributed Computing: Fundamentals, Simulations and Advanced Topics”, Second Edition, Wiley, 2004.
3. Pradeep K. Sinha, “Distributed Operating Systems: Design and Concepts”,

IEEE Press, 1997.

REFERENCE BOOKS

1. A.S.Tanenbaum, M.Van Steen, “Distributed Systems”, Pearson Education, 2004.
2. M.L.Liu, “Distributed Computing Principles and Applications”, Pearson Addison Wesley, 2004.
3. Tom White, “Hadoop: The Definitive Guide”, O'REILLY Media, 2009.

SOA FUNDAMENTALS**9**

Defining SOA, Roots of SOA, Characteristics of SOA, Concept of a service in SOA, Basic SOA architecture - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation.

WEB SERVICES AND SOA**9**

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination – Atomic Transactions – Business activities – Orchestration – Choreography – Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer.

SOA ANALYSIS AND DESIGN**9**

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Task centric business service design

ENTERPRISE PLATFORMS AND SOA**9**

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE)

SOA SECURITY**9**

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WSSecurity

Total : 45 Periods**TEXTBOOK:**

1. Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2005.

REFERENCES:

1. Thomas Erl, "SOA Principles of Service Design "(The Prentice Hall Service-Oriented Computing Series from Thomas Erl), 2005.
2. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
3. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.
4. Dan Woods and Thomas Mattern, "Enterprise SOA Designing IT for Business Innovation" O'REILLY, First Edition, 2006.

INTRODUCTION**9**

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources- Application of Open Sources. Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode – Process -Virtual File System – I/O Architecture and Device Drivers- Block Devices Handling.

OPEN SOURCE DATABASE**9**

MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time – Sorting Query Results – Generating Summary – Working with metadata – Using sequences – MySQL and Web.

OPEN SOURCE PROGRAMMING LANGUAGES**9**

PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails – Debugging and error handling – Security – Templates. Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples- Dictionaries – Conditionals and Loops – Files – Input and Output.

NETWORKING**9**

Transmission and Reception-Decisions and Traffic Direction- Notifying Drivers-Interrupt Handlers- Reasons for Bottom Half Handlers- Bottom Halves Solutions-Concurrency and Locking-Preemption-Overview of Network Stack – Bridging-Concepts-Spanning Tree Protocol.

OPEN SOURCE TOOLS AND TECHNOLOGIES**9**

Web Server: Apache Web server – Working with Web Server – Configuring and Using apache web services MDA: Introduction to MDA – Genesis of MDA – Meta Object Facility – UML – UML Profiles – MDA Applications.

Total : 45 Periods

REFERENCES:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002
3. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002
4. Wesley J. Chun, “Core Python Programming”, Prentice Hall, 2001
5. Peter Wainwright, “Professional Apache”, Wrox Press, 2002
6. Stephen J. Mellor, Marc Balces, “Executable UMS: A foundation for MDA”, AddisonWesley, 2002
7. Christian Benvenuti, “Understanding Linux Network Internals”, O’Reilly, 2006.
8. Y-D Lin, R-H Hwang and Fred Baker, “Computer networks – an open source approach”, McGraw- Hill, 2012.
9. Alessandro Rubini and Jonathan Corbet, “Linux device drivers”, 2nd edition, O’Reilly, 2001.

CS961 CRYPTOGRAPHY AND NETWORK SECURITY

L T P C

3 0 0 3

INTRODUCTION

9

Security trends – Attacks and Services – Classical Crypto Systems – Different types of Ciphers – LFSR sequences – Basic Number theory – Congruence Modulo – Chinese Remainder theorem – Modular exponentiation – Fermat and Euler's theorem – Secure programs – Non-malicious Program Errors – Viruses – Controls against Program Threat – Control of Access to General Objects – User Authentication – Good Coding Practices – Open Web Application Security Project

ENCRYPTION TECHNIQUES

9

Simple DES – Differential Crypto Analysis – DES – Modes of operation – Triple DES – AES – RC5, RC4 – RSA – Attacks – Primality test – Factoring

KEY EXCHANGE AND AUTHENTICATION TECHNIQUES

9

Discrete Logarithms – Computing discrete logarithms – Diffie–Hellman key exchange – Elliptic curve cryptography Key exchange – Elgamal Public Key Cryptosystems – Message Authentication codes – Hash functions – Hash algorithms – Secure Hash – Birthday attacks – MD5 – Authentication protocols – Digital signatures – RSA, DSA

NETWORK SECURITY AND STANDARDS

9

Public Key Infrastructure – Kerberos – X.509 – IPSec – Virtual Private Networks – E–Mail Security – PGP and PEM – Web Security – Secured DNS – SSL, TLS and SET – CoBIT Framework – Compliances – Credit Card Applications – GLBA – Standards – ISO 27000

OPERATING SYSTEMS AND DATABASE SECURITY

9

Trusted Operating systems – Security models – Designing trusted OS – Assurance – Database Security – Multi-level databases – Multi-level security

Total: 45 Periods

TEXT BOOKS

1. Wade Trappe, Lawrence C Washington, "Introduction to Cryptography with Coding Theory", Second Edition, Pearson Education, 2007.
2. William Stallings, "Cryptography and Network Security Principles and Practice", Fifth Edition, Prentice Hall, 2010.
3. Matt Bishop, "Computer Security: Art and Science", Pearson Education Inc., 2003.

REFERENCE BOOKS

1. Charles Pfleeger, Shari Lawrence Pfleeger, Devin N Paul, "Security in Coding", Pearson, 2007.
2. Wenbo Mao, "Modern Cryptography Theory and Practice", Pearson, 2004.

1. Implementation of lexical analyzer using flex and other lexical analyzer tools
2. Design predictive parser for the given language
3. Translation of regular expressions to NFA using parser generator (yacc)
4. Construction of parse tree
5. Exercise on scanner-parser specification for small language
6. Exercise on checking the grammar of the given string
7. Conversion of BNF rule to YACC form and generation of abstract syntax tree
8. Intermediate code generator
 - Assignment statements
 - Expressions with subscripted variables
 - Boolean expressions
 - Control structure
9. Flow graph construction from intermediate code
10. Code generation for the given machine specification

CS356 SERVICE ORIENTED ARCHITECTURE LABORATORY

L T P C
0 0 3 2

1. Develop at least 5 components such as Order Processing, Payment Processing, etc., using .NET component technology.
2. Develop at least 5 components such as Order Processing, Payment Processing, etc., using EJB component technology.
3. Invoke .NET components as web services.
4. Invoke EJB components as web services.
5. Develop a Service Orchestration Engine (workflow) using WS-BPEL and implement service composition. For example, a business process for planning business travels will invoke several services. This process will invoke several airline companies (such as American Airlines, Delta Airlines etc.) to check the
the
airfare price and buy at the lowest price.
6. Develop a J2EE client to access a .NET web service.
7. Develop a .NET client to access a J2EE web service.
8. Create a web service for currency conversion (at five currencies) with appropriate client program.

Department of Computer Science and Engineering

Semester VIII

Course Code	Course Title	L	T	P	C
GE451	Professional Ethics	3	0	0	3
CS903	Data Mining and Data Warehousing	3	0	0	3
CS907	Open Source Systems	3	0	0	3
CS451	Project Phase - II	0	0	16	8
TOTAL		9	0	16	17

GE451 PROFESSIONAL ETHICS

CS903 DATA MINING AND DATA WAREHOUSING

L P T C

3 0 0 3

INTRODUCTION TO DATA WAREHOUSING

9

Evolution of Decision Support Systems - Data warehousing Components – Building a Data warehouse - Data Warehouse and DBMS Data Marts - Metadata - Multidimensional Data Model - OLAP Vs OLTP - OLAP operations - Data Cubes - Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations

DATA WAREHOUSE PROCESS AND ARCHITECTURE

9

Types of OLAP Servers, 3-Tier Data Warehouse Architecture - Distributed And Virtual Data Warehouses - Data Warehouse Implementation, Tuning and Testing of Data Warehouse - Data Staging (ETL) Design and Development - Data Warehouse Visualization - Data Warehouse Deployment, Maintenance, Growth - Business Intelligence Overview- Data Warehousing and Business Intelligence Trends - Business Applications - Tools - SAS

INTRODUCTION TO DATA MINING

9

KDD Vs. Data Mining - Stages of the Data Mining Process - Task primitives - Data Mining Techniques - Data Mining Knowledge Representation – Data Mining Query Languages - Integration of a Data Mining System with a Data Warehouse – Issues: Data preprocessing – Data cleaning - Data transformation - Feature selection - Dimensionality reduction - Discretization - Mining Frequent Patterns - Association - Correlation

CLASSIFICATION AND CLUSTERING

9

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Clustering - Partitioning methods - k-means - Hierarchical Methods - distance-based agglomerative and divisible clustering - Density-based Methods – expectation maximization - Grid Based Methods – Model-Based Clustering Methods – Constraint-based Cluster Analysis – Outlier Analysis

DATA MINING SOFTWARE AND APPLICATIONS

9

Mining complex data objects - Spatial Databases - Temporal Databases - Multimedia Databases - Time series and Sequence data; Text Mining – Graph Mining - Web Mining - Application and trends in Data Mining

TOTAL: 45 PERIODS

TEXT BOOKS

1. Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufmann Publishers, third edition, 2011, ISBN: 1558604898.
2. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw-Hill Edition, Tenth Reprint 2007.
3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prentice Hall of India, 2006.

REFERENCE BOOKS

1. Mehmed Kantardzic, "Data Mining Concepts, Models, Methods and Algorithms", Wiley Interscience, 2003.
2. Ian Witten, Eibe Frank, "Data Mining: Practical Machine Learning Tools and Techniques", third edition, Morgan Kaufmann, 2011.
3. George M Marakas, "Modern Data Warehousing, Mining and Visualization", Prentice Hall, 2003.

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Total : 45 Periods

REFERENCES:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications, 2003
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002
3. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002
4. Wesley J. Chun, “Core Python Programming”, Prentice Hall, 2001
5. Peter Wainwright, “Professional Apache”, Wrox Press, 2002
6. Stephen J. Mellor, Marc Balces, “Executable UMS: A foundation for MDA”, AddisonWesley, 2002
7. Christian Benvenuti, “Understanding Linux Network Internals”, O’Reilly, 2006.
8. Y-D Lin, R-H Hwang and Fred Baker, “Computer networks – an open source approach”, McGraw- Hill, 2012.
9. Alessandro Rubini and Jonathan Corbet, “Linux device drivers”, 2nd edition, O’Reilly, 2001.

