CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY
COMPUTER SCIENCE AND ENGINEERING / INFORMATION TECHNOLOGY
B.E. I – Year

I - Semester

THEORY						
S.No	**Code**	**Subject**	**L**	**T**	**P/D**	**Credits**
1	EG 111	English - I	2	0	0	2
2	MT 111	Mathematics - I	3	1	0	3
3	PY 111	Engineering Physics - I	3	0	0	3
4	CY 111	Engineering Chemistry - I	3	0	0	3
5	CS 111	Programming and Problem Solving	3	1	0	3
6	CE 112	Environmental Studies	3	1	0	3
7	ME 112N	Engineering Graphics	1	0	3	3
PRACTICALS						
8	EG112	English Language laboratory – I	0	0	2	1
9	PY 114/ CY 114	Engineering Physics Lab – I / Engineering Chemistry Lab – I	0	0	3	2
10	CS 114	Programming Lab – I	0	0	3	2
11	IT 111	IT Workshop	0	0	3	2
TOTAL			**18**	**03**	**14**	**27**

II – Semester

THEORY						
S.No	**Code**	**Subject**	**L**	**T**	**P/D**	**Credits**
1	EG 121	English - II	2	0	0	2
2	MT 121	Mathematics - II	3	1	0	3
3	PY 122	Applied Physics	3	0	0	3
4	CY 121	Engineering Chemistry - II	3	0	0	3
5	CS 121	Object Oriented Programming through C++	3	1	0	3
6	EE 111	Principles of Electrical Engineering	3	1	0	3
7	CE 111	Engineering Mechanics – I	3	1	0	3
PRACTICALS						
8	EG 122	English Language Laboratory – II	0	0	2	1
9	PY 125 / CY 123	Engineering Physics Lab – II / Engineering Chemistry Lab – II	0	0	3	2
10	CS 122	Programming Lab- II	0	0	3	2
11	ME 114	Workshop	0	0	3	2
TOTAL			**20**	**04**	**11**	**27**

EG 121

ENGLISH – II
(common to all branches)

Instruction	2L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

- To understand the difference between oral and written communication, interpersonal and intrapersonal communication
- To acquaint the students with the process of technical writing through different types of reports and information transfer.
- To enhance the different sub- skills of reading through skimming and scanning.
- To enhance imaginative, creative and critical thinking through literary texts.
- To help students develop their Presentation skills through AV aids and different aspects of body language.

UNIT- I

Effective communication: Intrapersonal communication, Interpersonal communication, Dyadic Communication, One way versus two way communication and Johari Window.

UNIT- II

Grammar Practice: Common errors in English ad, Punctuation.

Vocabulary Enhancement:

Indian and American usage, Words often misspelt, Prefixes & Suffixes, technical vocabulary

Prose: Muthyala Raju Revu: An Engineer Turned IAS Officer.

UNIT- III

Writing Skills: Reports, Technical Report Writing, Information transfer: Flow charts, piecharts, graphs and scientific papers

UNIT- IV

Reading comprehension – Unknown passages, Skimming and Scanning, intensive reading and critical analysis.

Prose: R. Madhavan : Engineering to Farming

UNIT- V

Soft Skills: Presentation skills – Rubrics, use of AV aids and making of a Power Point Presentation, Body Language. Leadership skills and Team Building.

Text Books:

1. "Essential English"- E Suresh Kumar et al**.**(Orient Black Swan PVT Ltd.)
2. "Communication Skills and Soft Skills: An Integrated Approach"- E Suresh Kumar et al**. (**Pearson Publications)

Suggested Reading:

1. " High School English Grammar & Composition" – Wren and Martin (S.Chand)
2. "ABC of Common Grammatical Errors" – Nigel D Turton (Macmillan)
3. "Communication Skills & Soft Skills" – An Integrated approach – E Suresh Kumar (Pearson)
4. "Examine your English" – Margaret M Maison (Orient Longman)
5. "Professional Presentation" – Malcolm Goodale (Cambridge University Press)
6. "English Grammar at alance" – M. Gnanamurali (S. Chand)
7. "Business Communication & Soft skills" (Lab Manual) – D. Sudha Rani (Pearson)
8. "A Course Book in English" – K.R. Lakshminarayan (SciTech Publication)
9. "Effective Technical Communication" – M. Ashraf Rizvi (Tata- McGraw Hill)

MT 121

MATHEMATICS – II
(common to all branches except Bio-Tech)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

UNIT- I

Ordinary differential Equations: Exact Differential equations (integrating Factors) Applications differential equations-Orthogonal trajectories-Problems on oscillatory electrical circuits (LC and LCR circuits). Linear Differential equations of higher order with constant coefficients, complementary function and particular integrals when RHS is of the forms e^{ax}, sinax, cosax, x^m, $e^{ax}(v)$, $x^m(v)$, where v-is a function of 'x', Legender's and Cauchy's form of Homogeneous equations.

UNIT- II

Laplace Transforms: Definition of integral transform, domain of the function and kernel of the Laplace transforms. Existence of Laplace transforms. Properties- Laplace transforms of standard functions, Laplace transforms of piecewise continuous functions, first and second shifting theorems, multiplication by 't', division by 't'. Laplace transforms of derivatives and integrals of functions-Unit step function- Periodic functions (without proofs). Inverse Laplace transforms-by partial fractions (Heaviside method), Residue method-Convolution Theorem. Solving Ordinary differential equations by Laplace Transforms

UNIT- III

Series solution of Differential equations: Introduction-ordinary and singular points of an equation-power series solution- Solution of Legender equation (without proof)- Legendre polynomials-Rodrigue'sformula-Generating function of Legender polynomials-Recurrence relations- orthogonal property.

UNIT- IV

Vector Differentiation: Scalar and vector fields- directional derivative- Gradient of a scalar-Divergence and Curl of a vector point function. Properties of divergence, curl - vector identities. Solenoidal and Irrotational vectors.

UNIT-V

Vector Integration: Vector Line integrals, surface integrals and volume integrals
Greens Theorem, Gauss divergence Theorem and Stokes theorem (without proofs)
Applications of Integration-problems based on verification and evaluation using the above theorems (for cube, rectangular parallelepiped, sphere, cylinder)

Text Books:

1. Advanced Engineering by Kreyszig, John Wiley & Sons -Publishers.
2. Mathematical Methods of Science & Engg, Aided with MATLAB, Kanti.B.Datta. Cengage Learning India Pvt.Ltd.
3. Mathematics for Engineers and Scientists by Alen Jaffery , 6th ed 2013 CRC press,Taylor & Francis Group. (Elsevier)
4. Advanced Engineering Mathematics by Michael Greenburg, Second Edition –Pearson Education.

Suggested Reading: (for further reading and examples on applications)

1. Mathematics for Engineers-a modern interactive approach by A.Craft and Robert Davison-Willey
2. Applied Mathematics and physicists by Loius Pipes-Mc Graw Hill pubulishers.
3. Advanced Engineering Mathematics by R.K.Jain & S.R.K.Iyenger, 3rd edition, Narosa Publications
4. Matrices for Engineering Dynamics by AR Collar and A. Simpson-John Willey & sons
5. Essential Mathematics for Engineers by W.Bolton-Betterworth and Heineman
6. Mathematical for Physicists and Engineers- L F Landoviz, Publishers- Rienfold Book Corporation.
7. Higher Engineering Mathematics by B.S.Grewal, Khanna Publishers.
8. Engineering Mathematics by B.V.Ramana
9. Calculus by Smith and Minton
10. Applications of Linear Algebra by David.C Lay

PY 122

APPLIED PHYSICS
(common to CSE, IT, ECE & EEE)

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

UNIT – I

Elements of Quantum Mechanics:

Introduction – Dual nature of light – de Broglie's hypothesis – Expression for de Broglie's wave length – Heisenberg's uncertainty principle and its illustration (diffraction of a beam of electron at a slit) – Schrödinger time independent and time dependent wave equations – Interpretation of wave function – Infinite square well potential (particle in a box) – Potential step – Potential barrier (qualitative) – Tunneling effect.

UNIT – II

Crystallography: Space lattice – Unit cell – Crystal systems – Bravais lattices – Number of atoms per unit cell – Coordination number – Atomic radius – Packing fraction (for SC, BCC, FCC) – Lattice planes – Miller indices – Bragg's law – Experimental determination of lattice constant of cubic crystals by powder diffraction method.

Crystal Defects: Classification of defects – Point defects – Concentration of Schottky & Frenkel defects.

UNIT – III

Band Theory of Solids: Salient features of classical free electron theory – Energy band formation in solids – Kronig-Penny model (qualitative) – Classification of solids into conductors, semiconductors and insulators.

Semiconductors: Intrinsic and extrinsic semiconductors – Concept of hole – Concept of Fermi level – Carrier concentration in intrinsic semiconductors – Conductivity in semiconductors – Hall Effect in semiconductors.

UNIT – IV

Magnetic Materials: Classification of magnetic materials: dia, para, ferro, anti-ferro and ferrimagnetic materials – Weiss molecular field theory – Domain theory – Hysteresis curve – Soft and hard magnetic materials.

Dielectric Materials: Introduction – Dielectric polarization – Types of dielectric polarization: electronic, ioninc, orientation and space-charge polarization (qualitative) – Frequency and temperature dependence of dielectric polarization – Determination of dielectric constant (Schering bridge method) – Ferroelectricity – Barium titanate – Applications of ferroelectrics.

UNIT – V

Superconductors: Introduction – General properties of superconductors – Meissner's effect – Type I and Type II superconductors – BCS theory (qualitative) – Applications.

Thin Films: Distinction between bulk, thin and nanofilms – Thin film preparation techniques – Physical vapor deposition (PVD) techniques – Thermal evaporation – Electron beam evaporation – Pulsed laser deposition – Applications of thin films – Solar cell – Gas sensor.

Nanomaterials: Zero dimensional materials – Properties of materials at reduced size – Surface to volume ratio – Quantum confinement – Preparation of nanomaterials – Bottom-up methods: Sol-gel, Sputtering and Chemical vapor deposition (CVD) – Top-down methods: Ball milling – Elementary ideas of carbon nanotubes – Applications.

Text Books:

1. M.N. Avadhanulu and P.G. Kshirsagar, *A Text BookEngineering Physics*, S. Chand Publications, 2014
2. S.L. Gupta and Sanjeev Gupta, *Modern Engineering Physics*, DhanpatRai Publications, 2011
3. V. Rajendran, *Engineering Physics*, McGahill Education Publications, 2013

Suggested Reading:

1. R. Murugeshan and KiruthigaSivaprasath, *Modern Physics*, S. Chand Publications, 2005
2. M. Arumugam, *Materials Science*, Anuradha Publications, 2002.
3. Satyaprakash and Agarwal, *Statistical mechanics*, Kedannath Publications
4. P.K. Palanisamy, *Engineering Physics*, Scitech Publications, 2012
5. Hitendra K Malik and A.K. Singh, *Engineering Physics*, Tata McGahill Education Publications, 2011

CY 122

ENGINEERING CHEMISTRY - II
(common to all branches except Chemical Engg & Bio-Tech)

Instruction	3L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

The syllabus has sought to fulfill the objective of making the student of engineering and technology realize that chemistry like other subjects is the real base of his profession and that therefore he must have a good understanding of chemistry before he can use it in his profession. The various units of the syllabus is so designed to fulfill the following objectives.

1. Thermodynamics and Electrochemistry units give conceptual knowledge about spontaneous processes and how can they be harnessed for producing electrical energy and efficiency of systems. It also includes the devices used for electrical energy storage and captive generation and tapping it as and when required.
2. Newer materials lead to discovering of technologies in strategic areas like defense and space research. Recently modern materials synthesized find applications in industry and creating instruments for solving problems of electronics, telecommunications, health care, agriculture, and technology etc., Inorder to emphasize the above the topics like composite materials, polymers, conducting polymers and nano materials have been incorporated in the curriculum.
3. Knowledge to prevent corrosion of machinery and metallic materials and water chemistry which require serious attention in view of increasing pollution has been included in the syllabus.
4. Fuels have been taught with a view to give awareness as to materials which can be used as sources of energy and fuel cells which are the alternate energy sources for generating electrical energy on spot and portable applications.
5. To appraise the students about the importance and role of chemistry in the field of Engineering by explaining the relevant topics.
6. To enable students to apply the knowledge acquired in improving the properties of engineering materials.

The engineer who has the above background can effectively manage the materials in his designing applications and discovering and improving the systems for various uses in industry, agriculture, health care, technology, telecommunications, electronics and instruments detecting in advance in natural calamities. The above knowledge also helps students to carry out inter disciplinary research such that the findings benefit the common man.

UNIT – I

Electrochemistry

Introduction, construction of electrochemical cell, sign convention, cell notation, cell emf, SOP and SRP, electrochemical series and its applications

Activity, fugacity, Nernst equation and applications, numericals

Types of Electrodes – Standard Hydrogen Electrode, Saturated Calomel Electrode, Quinhydrone electrode and Ion selective electrode (Glass electrode), construction

UNIT – II

Corrosion Science

Introduction, causes and effects of corrosion, chemical and electro chemical corrosion, mechanism of electro chemical corrosion

Galvanic corrosion and types of differential aeration corrosion (pitting and waterline corrosion)

Factors affecting corrosion (position of the metals in galvanic series, relative areas of anode and cathode, nature of corrosion product – solubility and volatility of corrosion product, nature of corroding environment – temperature, humidity and P^H).

Corrosion control methods – cathodic protection, sacrificial anodic protection and impressed current cathodic protection.

Protective coatings – Anodic and cathodic coatings

Paints, constituents and their functions

UNIT – III

Water Chemistry

Hardness of water – Types, units of hardness, estimation of temporary and permanent hardness of water by EDTA method, alkalinity of water and its determination

Numericals on hardness and alkalinity

Specifications of potable water, disinfection of water by chlorination, break point chlorination and by ozone treatment

Desalination of water by reverse osmosis and electro dialysis

UNIT – IV

Fuels – II

Liquid fuels, fractional distillation of crude oil, cracking and significance, catalytic cracking by fixed bed cracking, knocking, significance, antiknocking agents (TEL, MTBE), octane number, cetane number, unleaded petrol.

Gaseous fuels, LPG, CNG, composition and uses, automobile exhaust – catalytic converter.

Battery Technology

Types of batteries, Lithium battery and Lithium ion battery, fuel cell – MeOH – Oxygen fuel cell, H_2-O_2 fuel cell Rocket propellants, requirements of a good propellant, classification, solid-liquid propellants with examples. Photo catalysis

UNIT –V

Instrumental Techniques in Chemical Analysis

Principle, method and applications of Conductometry (acid-base titration), Potentiometry (acid-base, redox titration), P^H-metry (acid – base titration), UV, Visible Spectro photometer (Beer-Lambert's Law), examples

Atomic absorption spectroscopy-Principle, instrumentation (Block Diagram only), estimation of Nickel by Atomic absorption spectroscopy

Text Books:

1. J.C. Kuriacase & J. Rajaram, "Chemistry in engineering and Technology", Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008)
2. S.S.Dara & S.S.Umare, "Engineering Chemistry", S.Chand company
3. ShasiChawla, "Text Book of Engineering Chemistry", Dhantpat Rai Publishing Company, NewDelhi (2008)
4. P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub, Co., New Delhi (2002)
5. Puri & Sharma, "Principles of Physical Chemistry
6. P.R.Vijayasarathi, "Engineering Chemistry" PHI Learning Private Limited, New Delhi (2011)

Suggested Reading:

1. Physical chemistry by P.W.Atkin (ELBS OXFORD PRESS)
2. Physical chemistry by W.J.Moore (Orient Longman)
3. Physical Chemistry by Glasstone
4. Physical Chemistry by T.Engel & Philip Reid, Pearson Publication
5. Introduction to nano materials by T.Pradeep

EE 111

PRINCIPLES OF ELECTRICAL ENGINEERING
(common to CSE, IT & Bio-Tech)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

UNIT – I

D.C. Circuits and network theorems: Electric Circuit parameters(R,L,C), Voltage, Current, Power, Kirchhoff's laws, mesh current and node voltage analysis, superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem.

UNIT – II

Electromagnetic Induction: Electromagnetic induction, Faraday's laws of electromagnetic induction, static and dynamically induced EMF

A.C. Circuits: Generation of alternating voltage and current, equation of alternating voltage and current, average and rms values of sinusoidal quantities, form and peak factors, phasor representation of sinusoidal quantities, ac through pure resistance pure Inductance, pure capacitance, AC series RL,RC,RLC circuits.

UNIT- III

D.C Generators: working principle, construction, types of armature winding, emf equation, types of excitation, characteristics of series, shunt and compound generators, losses and efficiency.

D.C Motors: working principle, back emf, types of excitation, torque equation, characteristics of series, shunt and compound motors, speed control of shunt and series motors.

UNIT - IV

Single phase transformer: Constructional details, working principle, Ideal transformer, emf equation, equivalent circuit, voltage regulation, losses and efficiency, condition for maximum efficiency, open circuit and short circuit test.

UNIT -V

Three phase Induction Motors: Construction, production of rotating magnetic field, working principle, types, slip, torque equation, starting torque, maximum torque, torque slip characteristics.

Text Books:

1. Edward Hughes, Electrical Technology, 6th Edition, ELBS, 2001
2. V.K. Mehta, Principles of Electrical engineering, S.Chand & Co

Suggested Reading:

1. B.L. Theraja & A.K. Theraja, Electrical Technology, Vol.I, S.Chand & Co
2. P.V.Prasad & S. Siva Nagraju, Electrical Engineering: Concepts & Applications, Cengage Learning

CS 121

OBJECT ORIENTED PROGRAMMING THROUGH C++
(common to all branches)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

UNIT- I

Principles of Object Oriented Programming: Procedure Vs Object Oriented, Paradigm, Basic concepts, benefits, Applications and Object Oriented Languages.

Introduction: Program structure, Creating, Compiling and Linking of C++ program.

Token, Expression and Control Structures: Tokens, Keywords, Identifiers and Constants, Data Types, Operators, Precedence, Type Compatibility, Control Structures, New Features of C++.

Functions: Function Prototype and Parameter Passing, Inline Functions, Default, Constant Arguments, Recursion, Function Overloading, Function Template.

UNIT - II

Classes and Objects: Defining classes and Member functions, Arrays, Static Members, Friend Functions.

Constructors and Destructors: Type of Constructors, Dynamic Initialization of Objects, Destructors.

UNIT - III

C++ operator overloading: Fundamentals, restrictions, overloading unary / binary operators, overloading ++ and --, Manipulation of Strings.

C++ Inheritance: Defining derived classes, Types of Inheritance, Virtual Base class Abstract Class, Nesting of classes.

UNIT- IV

Pointers and Polymorphism: Pointers and Generic pointer, Pointer to Objects and Derived Classes, this pointer, Virtual Functions, Virtual Destructors.

C++ Stream Input/Output: Streams, Stream classes, Formatted and Unformatted operations, Manipulators.

Files: Classes for file Stream operations, Sequential and Random access operations, Command line Arguments

UNIT-V

C++ Templates: Introduction, class templates, member function template, overloading template functions.

C++ Exception Handling: Try, throw, catch

Suggested Reading:

1. E. Balagurusamy **"**Object Oriented Programming with C++" , McGraw-Hill Education (India), 6th Edition 2013
2. Bjarne Stroustrup "The C++ Programming Language", Pearson Education, 5th Edition (2013)
3. Robert Lafore **"**Object-Oriented Programming in C++ " 4th Edition Sams Publishing, 2002

CE 111

ENGINEERING MECHANICS - 1
(common to all branches)

Instruction	3L + 1T Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

- To provide fundamental understanding of any anatomy for which Engineering Mechanics forms the basis.
- To understand the concept of force transfer, necessary conditions of equilibrium, significance of friction and geometric properties in statics.
- To equip the students to apply the principles learnt for the analysis of structures and equipments.

UNIT - I

Force Systems: Resolution of coplanar and non-coplanar force systems (both concurrent and non-concurrent), Determining the resultant of all force systems using scalar and vector concepts.Moment of force and its applications.

UNIT – II

Equilibrium of Force System: Free body diagrams, equations of equilibrium of planar force systems. Equilibrium of spatial force systems.

UNIT – III

Theory of Friction: Introduction,types of friction, laws of friction, application of friction to a single body & connecting systems. Wedge and belt friction.

UNIT – IV

Centroids: Significance of centroids, moment of area, centroids of line elements, plane areas, composite areas, theorems of Pappus& its applications.

UNIT – V

Area Moment of Inertia: Definition, polar moment of Inertia, radius of gyration, transfer theorem, moment of Inertia of plane & composite areas, product of inertia, transfer formula for product of inertia.

Text Books:

1. K. Vijay Kumar Reddy and J. Suresh Kumar, *Singer's Engineering Mechanics*, BS Publications, Hyderabad, 2011.
2. Ferdinand L Singer,*Engineering Mechanics*,Harper and Collins, Singapore, 1904.

Suggested Reading:

1. A. Nelson, *Engineering Mechanics*, Tata McGraw Hill, New Delhi, 2010.
2. S. Rajashekaran& G. Sankarasubramanyam, *Engineering Mechanics*,Vikas publications, Hyderabad, 2002.
3. S.B. Junarkar and H.J Shah, *Applied Mechanics***,** Charotar publishers, New Delhi, 2001.
4. Basudeb Bhattacharyya, *Engineering Mechanics*, Oxford University Press, New Delhi, 2008.
5. K.L Kumar &Veenu Kumar, *Engineering Mechanics*, Tata McGraw Hill, New Delhi, 2011.

EG 122

ENGLISH LANGUAGE LABORATORY – II
(common to all branches)

Instruction	2 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	1

COMPUTER ASSISTED LANGUAGE LEARNING LAB (CALL)

Introduction:

The language lab focuses on the practice of connected speech and word stress. They are also introduced to the process of Listening.
The following are the **objectives** of the course:

1. To recognize and be familiar with word stress and identify stress patterns.
2. To develop awareness of rhythm and notion of stress time.
3. Listen effectively in a variety of situations for a variety of purposes; practice the behavior of effective, active listeners.
4. Assess strengths in listening and set goals for the future.

SYLLABUS:

1. Word stress: Primary stress, secondary stress, functional stress, rules of word stress.
2. Rhythm & Intonation: Introduction to Rhythm and Intonation. Major patterns, intonation of English with the semantic implications.
3. Aspects of connected speech: Strong forms, weak forms, contracted forms, elision.
4. Listening skills.

INTERACTIVE COMMUNICATION SKILLS LAB (ICS LAB)

Introduction:

The objective of the course is to introduce them to the art of making effective presentations. They also learn do debate, the interview process and interview skills.
The following are the **objectives** of the course:

1. To enable students to express themselves fluently and appropriately in social and professional contexts.
2. To provide techniques for preparing and delivering a presentation.
3. Practicing interview skills via an interpersonal encounter similar to real life situation.
4. To understand and communicate various forms of argument effectively, to develop the ability to analyze, evaluate, construct and refute arguments.

SYLLABUS:

1. Debate: Differences between a debate and a group discussion. Essentials of a debate, conducting a debate.
2. Presentation Skills: Making effective presentations, expressions which can be used in presentation, use of non-verbal communication, coping with stage fright , handling question and answer session; use of audio- visual aids , Power point presentations.
3. Interview skills: Planning and preparing for interviews, facing interviews confidently, use of suitable expressions during interview.

Suggested Reading:

1. E.Suresh kumar et al, **. English for Success** (with CD), Cambridge University Press India Pvt Ltd. 2010.
2. T Balasubramanian. **A Textbook of English Phonetics for Indian Students**, Macmillan, 2008.
3. J Sethi et al. **A Practical Course in English Pronunciation** (with CD), Prentice Hall India, 2005.
4. Edgar Thorpe. **Winning at Interviews**, Pearson Education, 2006
5. Priyadarshi Patnaik**. Group Discussions and Interviews,** Cambridge University Press Pvt Ltd 2011

PY 125

ENGINEERING PHYSICS LAB - II
(common to all branches except Bio-Tech)

Instruction	3 Periods per alternate week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

1. Planck's Constant – Determination of Planck's Constant using photo cell
2. Solar Cell – Study of I-V characteristics of given solar cell and calculation of fill factor, efficiency and series resistance
3. Hall Effect – Determination of Hall coefficient, carrier concentration & mobility of charge carriers of given semiconductor specimen
4. P-N Junction Diode – Study of V-I characteristics and calculation of resistance of given diode in forward and reverse bias
5. B-H Curve – Determination of hysteresis loss of given specimen
6. Dielectric Constant – Determination of dielectric constant of given PZT sample at phase transition temperature
7. Energy Gap – Determination of energy gap of given semiconductor
8. Thermistor – Determination of temperature coefficient of resistance of given thermistor
9. *e/m* of Electron by Thomson's Method
10. Thermoelectric Power – Determination of thermoelectric power of given sample

CY 123

ENGINEERING CHEMISTRY LAB - II
(common to all branches except Chemical and Bio-Tech)

Instruction	3 Periods per alternate week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives

1. To impart fundamental knowledge in handling the equipment/glassware and chemicals in the chemistry laboratory.
2. To offer hands on experience on the basic equipment related to engineering chemistry.
3. For practical understanding of theoretical concepts of chemistry

I. Volumetric Analysis:

1. Estimation of amount of copper ion using hypo solution.
2. To find out saponification number of oil.

II. Complexometry

3. Estimation of permanent and temporary hardness of water using EDTA solution.
4. Ore analysis – estimation of MnO_2 in pyrolusite.

III. Organic Preparations

9. Preparation of aspirin
10. Preparation of azodye

IV. Instrumental Chemical Analysis

i) Potentiometric Titrations

5. Strong acid vs strong base
6. Redox titration (estimation of Fe^{+2} using $KMnO_4$ solutions)

ii) pH metric titration

7. Strong acid vs strong base

iii) Polarimetry

8. Specific rotation of sucrose and inversion of sucrose.

Suggested Reading:

1. Vogel's text book of quantitative chemical analysis by J.Mendham & Thomas, Pearson education; Pvt.Ltd.new Delhi 6th ed.2002
2. Senior practical physical chemistry by BD Khosla, A.Ghulati, VC.Garg; R.Chand and CD; New Delhi 10th ed 2001.
3. Laboratory manual in engineering chemistry by S.K.Bhasin and Sudha Rani; Dhanpath Rai publishing company.

CS 122

PROGRAMMING LAB - II
(common to all branches)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

1. Program to implement function overloading
2. Program to implement function template
3. Program to implement types of constructors and destructor
4. Program to implement new and delete operators (Dynamic memory allocation).
5. Program to implement unary and binary operator overloading
6. Creation of inheritance hierarchy for graphic shapes.
7. Implementation of runtime polymorphism
8. Classes for Bank Account, Student information, Library catalog
9. Implementation of Streams.
10. Implementation of Template Classes.

ME 114

WORKSHOP
(common to CSE, IT, ECE & EEE)

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Trades For Practice

1. **Carpentry**	**2. Plumbing**	3. **House Wiring**	**4. Tin Smithy & Soldering**

Exercises in Carpentry

1. To plane the given wooden piece to required size
2. To make a cross lap joint on the given wooden piece according to the given dimensions.
3. To make a Tee lap joint on the given wooden piece according to the given dimensions.
4. To make a dove tail-joint on the given wooden piece according to the given dimensions.
5. To make a bridle joint on the given wooden piece according to the given dimensions.

Exercises in Plumbing

1. To make external threads for GI pipes using dies.
2. To connect the GI pipes as per the given diagram using taps, couplings & bends.
3. To connect the GI pipes as per the given diagram using, couplings, unions, reducer & bends.
4. To connect the GI pipes as per the given diagram using shower, tap & valves
5. Demonstration of above exercise by giving water connection.

Exercises in House Wiring

1. Wiring of one light point controlled by one single pole switch, a three pin socket controlled by a single pole switch, and wiring of one buzzer controlled by a bell push.
2. Wiring of two light points connected in series and controlled by single pole switch. Verify the above circuit with different bulbs.
3. Wiring of two light points connected in parallel from two single pole switches and a three pin socket
4. Stair case wiring-wiring of one light point controlled from two different places independently using two 2-way switches.
5. Go-down wiring.

Exercises in Tin Smithy

1. To make a square tray from the given sheet metal.
2. To make a rectangular box from the given from the sheet metal with base and top open. Solder the corners.
3. To make a scoop.
4. To make a dust pan from the given sheet metal.
5. To make a pamphlet box.

Demonstration of BOSCH tools.

Note: A minimum of 12 exercises from the above need to be done

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY
COMPUTER SCIENCE AND ENGINEERING
B. E. II - Year

I–Semester

THEORY						
S.No	**Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	MT 211	Fourier Analysis and Partial Differential Equations	4	0	0	3
2	CS 211	Data Structures using C++	4	1	0	3
3	CS 212	Logic & Switching Theory	4	0	0	3
4	CS 213	Discrete Mathematics	4	1	0	3
5	EC 215	Basic Electronics	4	0	0	3
6	MB214	Managerial Economics and Accountancy	4	0	0	3
PRACTICALS						
7	CS 214	Data Structures Lab using C++	0	0	3	2
8	EC 218	Basic Electronics Lab	0	0	3	2
TOTAL			**24**	**02**	**06**	**22**

II–Semester

THEORY						
S.No	**Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	MT 221	Complex Variables and Probability Statistics	4	0	0	3
2	CS 221	Computer Organization	4	0	0	3
3	CS 222	Programming in Java	4	1	0	3
4	CS 223	Data Communications	4	0	0	3
5	CS 224	Principles of Programming Languages	4	0	0	3
6	CS 225	Microprocessors & Microcontrollers	4	1	0	3
PRACTICALS						
7	CS 226	Java Lab	0	0	3	2
8	CS 227	Microprocessors & Microcontrollers Lab	0	0	3	2
TOTAL			**24**	**02**	**06**	**22**

MT 211

FOURIER ANALYSIS AND PARTIAL DIFFERENTIAL EQUATIONS

Instruction	4L Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Introduce the concepts of Fourier analysis & z-transforms in engineering applications.
2. Introduction of boundary value problems and their applications in Heat Transfer and wave propagation.

Course Outcomes:

1. Students must be able to apply mathematical concepts of Fourier series, Fourier Transforms in solving one dimensional wave equation, Heat equation and the two dimensional Laplace equations.

UNIT– I

Fourier Series:

Dirichlet's conditions - expansion of a given function in Fourier series. Expansion of even and odd functions in Fourier series. Change of interval, half range sine and cosine series. Complex form of Fourier series.

UNIT– II

Fourier Transforms:

Fourier integral (statement only)-Fourier transform, Inverse Fourier transform, Fourier sine and cosine transform, definitions and properties.

UNIT– III

Partial Differential Equations:

Formation of Partial differential equations by elimination of arbitrary constants and by elimination of arbitrary functions. Partial differential equations of First Order- Lagrange's Linear equation and its solution. Partial differential equations of First order but of any degree-Standard types: I- $f(p,q)=0$, $II-f(z,p,q)=0$, III- $f(x,p)=f(y,q)$ and IV- $z=px+qy+f(p,q)$ .General Method of solution: Two independent variables - Char pit's Method; three or more independent variables - Jacobi's method.

UNIT– IV

Applications of Partial Differential Equations:

Solutions of Partial differential equations by the method of separation of variables- boundary value problems. One dimensional Wave equation, one dimensional Heat equation- related problems. Laplace equation

UNIT – V

Z- Transforms: Introduction, Basic theory of Z-transforms. Z-transforms of some standard sequences, Existence of z-transform. Properties of z-transforms: Linearity, Translation, scaling properties. Initial and final vale theorems. Differentiation of
Z-transforms, convolution theorem, Solution of difference equations using
Z-transforms.

Text Books:

1. Kanti B Datta "Mathematical Methods of Science and Engineering (Aided with MATLAB)" CENGAGE Learning.
2. B.S.Grewal "Higher Engineering Mathematics", Khanna Publishers 42nd Edition.2013
3. M.D.Raisinghania , Text Book of ODE and PDE , S.Chand publishers 4th -2012

With effect from the academic year-2014-15

CS 211 DATA STRUCTURES USING C++

Instruction	4 L+1T Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives

1. To teach the importance of structuring the data for easy access and storage.
2. To teach the implementation of various data structures.
3. To acquire skills in using generic principles for data representation and manipulation with a view for efficiency, maintainability, and code reuse.

Course Outcomes

1. Student will be able to choose appropriate data structure as applied to specified problem definition.
2. Student will be able to handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
3. Students will be able to identify the strengths and weaknesses of different data structures and apply in various applications.
4. Students will be able to think critically for improvement in solutions.

UNIT-I

Algorithm Specification, Performance Analysis and Measurement.

Arrays: Abstract Data Types and the C++ Class, The Array as an Abstract Data Type, The Polynomial Abstract Data Type, Sparse Matrices, Representation of Arrays.

UNIT-II

Stacks and Queues: Templates in C++, The Stack Abstract Data Type, The Queue Abstract Data type, Sub typing and Inheritance in C++, Evaluation of Expressions (Infix to postfix Conversion, Postfix Evaluation).

UNIT-III

Linked Lists: Singly Linked Lists and Chains, Representing Chains in C++, The Template Class Chain, Circular Lists, Linked Stacks and Queues, Polynomials, Sparse Matrices, Doubly Linked Lists, Generalized Lists.

UNIT-IV

Trees: Introduction, Binary Trees, Binary Tree Traversal, Threaded Binary Trees, Heaps, Binary Search Trees.

Graphs: The Graph Abstract Data Type, Elementary Graph operations (dfs and bfs), Minimum Cost Spanning Trees (Prim's and Kruskal's Algorithms).

UNIT-V

Sorting: Insertion sort, Quick sort, Heap sort, Sorting on Several Keys, Summary of Internal Sorting.

Hashing: Static Hashing.

Efficient Binary Search Trees: AVL Trees, Red-Black Trees, Splay Trees, m-way Search Trees, B-Trees.

Text Books:

1. Ellis Horowitz, Dinesh Mehta, S. Sahani. Fundamentals of Data Stuctures in C++, Universities Press. 2007.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, Pearson Education Fourth Edition, 2013.

Suggeted Reading:

1. Richard F. Gilberg & Behrouz A. Forouzan. Data Structures A Pseudocode Approach with C, CENGAGE Learning Second edition, 2005.
2. Jean-Paul Tremblay, P. G. Sorenson Introduction to Data Structure and its Applications, Mc Graw-Hill, 1984.

With effect from the academic year-2014-15

CS 212 LOGIC AND SWITCHING THEORY

Instruction	4 Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

1. To understand the architecture of basic building blocks, logic gates , Adders, Subtractors and Multipliers and other digital devices.
2. To understand the logic of minimization techniques including Quine-Mcclusky method.
3. To analyze and design the Combinational and Sequential circuits.
4. To familiarize the notations of HDL descriptions in VHDL.

Course Outcomes

1. Ability to Design basic digital circuits in Computer Hardware and system.
2. Ability to use high level Hardware Description languages such as VHDL for the design of Combinational and Sequential circuits.

UNIT-I

Digital Computers and Information: Information representation, Computer Structure.
Number Systems: Binary Numbers, Octal and Hexadecimal Numbers, Number Ranges.
Arithmetic Operations: Conversion from Decimal to other bases. Binary Addition and Subtraction.BCD Addition.
Alphanumeric Codes: ASCII Character Code, Parity Bit.
Binary Logic and Gates: Binary Logic, Logic Gates.
Boolean Algebra: Basic Identities, Algebraic Manipulation, Complement of a function.
Standard Forms: Miniterms and Maxterms, sum of products and products of sums.

UNIT-II

Minimization of Switching Functions: Introduction, the map method, minimal functions and their properties, the tabulation procedure, the prime implicant chart.
NAND and NOR Gates: NAND Circuits, Two-level Implementation, Multilevel NAND Circuits, NOR Circuits.
Exclusive or Gates: Odd Function, Parity Generation and Checking.

UNIT – III

Combinational Logic Design: Combinational Circuits, **Design Topics:** Design Hierarchy, Top-Down design, Computer Aided Design. Hardware Description Languages, Logic Synthesis.
Analysis Procedure: Derivation of Boolean Functions, Derivation of the Truth Table, Logic Simulation,
Design Procedure: Decoders, Encoders, Multiplexers, Binary Adders, Binary Subtractor, Binary Multiplier, HDL Representations – VHDL.

UNIT-IV

Sequential Circuits: Sequential circuit definitions, Latches, Flip Flops, sequential circuit analysis, sequential circuit design, design with D Flip-Flops, designing with JK Flip-Flops, HDL representation for sequential circuits – VHDL.

UNIT – V

Registers and Counters : Registers, Shift registers, Synchronous Binary counters, Ripple counter.
Symmetric functions and Networks: Properties and identification of symmetric functions. Symmetric Networks.

Text Books:

1. M. Moris Mano, Charles R. Kime, Logic and Computer Design Fundamentals, 2nd edition, Pearson Education Asia, 2001. .
2. Zvi Kohavi, Switching and Finite Automata Theory, 2nd edition, Tata McGraw Hill, 1995.

Suggested Reading:

1. H.T. Nagle, Introduction to Computer logic, Prentice Hall, 1975.
2. Charles H. Roth, Jr Fundamentals of Logic Design, 5th edition, Thomson, Brook, Cole, 2005.

With effect from the academic year-2014-15

CS 213 DISCRETE MATHEMATICS

Instruction	4L+1T Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

1. To introduce Mathematical Logic, especially First Order Logic to students intending to graduate in Computer Science.
2. To introduce proof techniques such as Mathematical Induction and Contradiction.
3. To Develop an understanding of counting, functions and relations.
4. To make the students familiar with fundamental notions and applicability of algebraic systems and graph theory.

Course Outcomes

1. Distinguish between Propositional Logic and Predicate Logic.
2. Apply induction and other proof techniques towards solving recurrences and other problems in elementary algebra.
3. Have an understanding of elementary combinatorics.and distinguish between functions and relations.
4. Deal with problems which may arise in Computer Science and Engineering in near future and be better equipped for examinations involving placement opportunities

UNIT-I

Fundamental Principles of counting: The Rules of Sum and Product, permutations, Combinations: Binomial Theorem
Introduction to Propositional Calculus: Basic Connectives and Truth tables, Logical Equivalence: Laws of Logic, Logical Implication: Rules of Inference.
Predicates: The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems

UNIT-II

Sets: Sets and Subsets, Operations on sets and the Laws of Set Theory, Counting and Venn Diagrams
Relations and Functions: Cartesian Products and Relations, Functions:one-one and Onto Pigeonhole principle, partial ordering relations, POSET, hasse diagrams, Equivalence relations.

UNIT-III

Generating function: Generating Functions, Function of Sequences, Calculating Coefficient of generating function.
Recurrence Relations: The First Order Linear Recurrence Relation, Second Order Linear. Homogenous Recurrence relations with constant coefficients, NonHomogenousRecurence relations.

UNIT-IV

Introduction to graphs: Graphs and their basic properties - degree, path, cycle, Sub graphs, Complements and Graph Isomorphism, Euler trails and circuits, planar graphs, Hamiltonian paths and cycles, Graph Coloring and Chromatic polynomial
Trees: Definitions, Properties, Rooted Trees, Spanning Trees, Minimum Spanning trees : The Algorithms of Kruskal and Prim.

UNIT-V

Algebraic Structures: Algebraic Systems: Examples and General Properties, Semigroups and Monoids, Groups: Definitions and Examples, Subgroups and Homomorphisms.
Lattices: Lattices as Partially Ordered Sets, Lattices as Algebraic Systems.

Text books:

1. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics, An Applied Introduction, 4th edition, Pearson Education, 2003.
2. J.P. Tremblay, R.Manohar, Discrete Mathematical Structures with Applications to Computer Science, TATA McGraw-Hill Edition,1995.

Suggested Readings :

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, 7th edition, Tata McGraw-Hill, 2005.

2. Joe L.Mott, Abraham Kandel, Theodore P. Baker, Discrete Mathematics for Computer Scientists & mathematicians, 2nd Edition , PHI ,1986.
3. David D.Railey,Kenny A.Hunt, Computational Thinking for the modern problem solving, CRC Press,2014.
4. Uwe Naumann,Olaf Scherk, Combinatorial Scientific Computing,CRC Press,2012.

With effect from the academic year-2014-15

EC 215 **BASIC ELECTRONICS**
(Common for CSE, IT, MECH, PROD)

Instruction	4 Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:
1. To understand the knowledge of basic semiconductor devices and create foundation for forthcoming circuit design courses.
2. To understand various applications like amplifiers, oscillators and op-amps also motivate and train students in logic design.
3. To understand the working principle of the transducers and aware the students about the advances in Instrumentation.

Course Outcomes:
1. Ability to understand the usefulness of semiconductor devices in circuit making like rectifiers, filters, regulators etc.
2. Ability to develop new directions in logic design to analyze, design and implement combinational circuits.
3. Ability to analyze the principles and practices for instrument design to development the real world Problems.

UNIT – I
Semiconductor Theory: Energy levels, Intrinsic and Extrinsic Semiconductor, Mobility, Diffusion and Drift current, Hall effect, Law of mass action, Characteristics of P-N Junction diode, current equation, Parameters and Applications.
Rectifiers: Half wave and Full wave Rectifiers Bridge and center tapped with and without filters, Ripple factor, regulation and efficiency.

UNIT – II
Transistors: Bipolar and field effect transistors with their h-parameter equivalent circuits, Basic Amplifiers classification and their circuits (Qualitative treatment only).
Regulators and Inverters: Zener Diode**,** Breakdown mechanisms, Characteristics, Effect of Temperature, Application as voltage regulator

UNIT-III
Feedback Amplifiers: Properties of Negative Feedback Amplifier, Types of Negative Feedback, Effect of negative feedback on Input impedance and Output impedance,Appilications (Qualitative treatment only)
Oscillators: principle of oscillations, LC Type-Hartley, Colpitts and RC Type- Phase shift, Wien Bridge and Crystal Oscillator (Qualitative treatment only).

UNIT – IV
Operational Amplifiers: Basic Principle, Ideal and practical Characteristics and Applications-Summer, Integrator, Differentiator, Instrumentation Amplifier.
Digital System: Review of basic gates, Universal gates, Demorgan's theorem, minimization with Karnaugh Map up to three variables and realization of half, Full Adder and half, Full Sub tractors.

UNIT – V
Data Acquisition systems: Study of transducers-LVDT, Strain gauge
Photo Electric Devices and Industrial Devices:
Photo diode, Photo Transistor, LED, LCD, SCR, UJT Construction and Characteristics and their applications only.
Display Systems: Constructional details of C.R.O and Applications

Text Books:
1. Robert L. Boylestad, Louis Nashelsky, K.Lal Kishore, Electronic Devices and Circuits Theory, Pearson Education, 9TH edition, LPE, Reprinted, 2006.
2. S.Shalivahan, N. Suresh Kumar, A Vallavea Raj, Electronic Devices and Circuits, Tata McGraw Hill, 2003
3. Morris Mano, Digital Design, Pearson Education, Asia 2002.

Suggested Reading:

1. Jacob Milman and C., Halkias, Electronic devices, Mc Graw Hill, Eight Edition, Reprinted, 1985.
2. Ramakanth A. Gayakwad, Op-AMPS and Linear Integrated Circuits, Prentice Hallof India, 3rd edition,1985
3. W. D.Cooper, A. Helfric, Electronic Instrumentation and Measurement Techniques, PHI, 4th edition.

With effect from the academic year-2014-15

MB 214 MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction:	4L periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Internal Examination	20 Marks
Case Study/ Assignment	5 Marks
Credits	3

Course Objectives:

1. The objective of the course is to provide the analytical tools and managerial insights that are essential for the solution of those business problems that have significant consequences for the firm and society.

Course Outcomes:

The student will be able to:

1. apply the concepts and principles of managerial economics in the business situations.
2. understand the capital management techniques and procedures in accountancy.

UNIT-I

Introduction to Managerial Economics

Introduction to Economics and its evolution - Managerial Economics - its scope, importance, Its usefulness to engineers - Basic concepts of Managerial economics.

UNIT-II

Demands Analysis

Demands Analysis - Concept of demand, determinants, Law of demand, its assumptions, Elasticity of demand, price, income and cross elasticity, Demand Forecasting - Markets Competitive structures, price-output determination under perfect competition and Monopoly. (Theory questions and small numerical problems can be asked).

UNIT-III

Production and Cost Analysis

Theory of Production - Firm and Industry - Production function - input-out relations - laws of returns - internal and external economies of scale. Cost Analysis: Cost concepts - fixed and variable costs - explicit and implicit costs out of pocket costs and imputed costs - Opportunity cost - Cost output relationship - Break-even analysis. (Theory and problems).

UNIT-IV

Capital Management

Capital Management, its significance, determinants and estimation of fixed and working capital requirements, sources of capital - Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.
(Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT-V

Accountancy

Book-keeping, principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance concept and preparation of Final Accounts with simple adjustments.
(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement).

Text Books:

1. Mehta P.L., "Managerial Economics – Analysis, Problems and Cases", Sulthan Chand & Son's Educational publishers, 2011.
2. Maheswari S.N. "Introduction to Accountancy", Vikas Publishing House, 2005.
3. Panday I.M. "Financial Management", Vikas Publishing House, 2009.

Suggested Reading:

1. Varshney and KL Maheswari, Managerial Economics, Sultan Chand, 2001.

2. M.Kasi Reddy and S.Saraswathi, Managerial Economics and Financial Accounting, Prentice Hall of India Pvt Ltd, 2007.
3. JC Pappas and EF Brigham, Managerial Economics.

With effect from the academic year-2014-15

CS 214 DATA STRUCTURES LAB USING C++

Instruction	3 Periods per week
Duration of Main Examination	3 Hours
Main Examination	50 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Design and construct simple programs with object oriented features.
2. To enhance programming skills while improving their practical knowledge in data structures.
3. To strengthen the practical ability to apply suitable data structure for real time applications.

Course Outcomes:

1. To be able to write object oriented programs for different data structures.
2. Understand and use the common data structures like Arrays, Linked lists, Trees Graphs etc. in various applications.

List of Experiments:

1. Implementation of Stacks using arrays and linked lists.
2. Implementation of Queues using arrays and linked lists.
3. Implementation of Infix to Postfix Conversion.
4. Implementation of evaluation of postfix expression.
5. Implementation of Polynomial arithmetic using linked list.
6. Implementation of Static Hashing (Use Linear probing for collision resolution).
7. Implementation of Merge and Quick sorts.
8. Implementation of Heap Sort.
9. Implementation of Radix Sort.
10. Implementation of Breadth first search and depth first search on graphs.
11. Implementation of Tree Traversals on Binary Trees.
12. Group Projects on Applications of Various Data Structures like Mazing Problem(using Stacks), Threaded Binary Tree, Minimum Spanning Tree(Prim's and Krukals), Huffmann Coding, B-Tree, AVL Tree, Sparse Matrices

Suggested Reading:

1. Michael T.Goodrich, Roberto Tamassia,, David M.Mount, Data Structures and Algorithms in C++, John Wiley &Sons,2nd edition,2003.
2. Stefan Brandle, Jonathan Geisler, James Roberge, David Whittington , C++ Data Structures, A laboratory Course, Jones &Bartlett Publishers, 3rd edition,2008.

With effect from the academic year-2014-15

EC 218 **BASIC ELECTRONICS LAB**
(Common for CSE, IT, MECH, PROD)

Instruction	3 Periods per week
Duration of Main Examination	3 Hours
Main Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. To study the electronics components.
2. To study characteristics of semi-conductor devices.
3. To study simple electronic circuits.

Course Outcomes:

The student will be able to

1. Understanding the knowledge regarding electronics components and equipment.
2. Design various rectifiers and filters. Analysis of characteristic behavior of BJT,FET.
3. Design of an amplifier.
4. Verify the operation of Op-amp for various applications.

List or Experiments:

1. Study of Electronic components.
2. Characteristics of Semiconductor diodes (Ge, Si and Zener).
3. CRO and its Applications.
4. Half, Full wave rectifiers with and without filters.
5. Voltage Regulator using zener diode.
6. Characteristics of BJT in CE Configuration.
7. Characteristics of FET in CS Configuration.
8. Amplifier with and without feedback.
9. RC Phase shift oscillator
10. Operational Amplifier and its applications.
11. Verification of Logic gates
12. Realization of Half and Full adder

Suggested Reading:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, Basic Electronics, A Text - Lab Manual, 7th Edition, TMH,1994.
2. Paul B. Zbar, Industrial Electronics, A Text - Lab Manual, 3rd Edition,

With effect from the academic year-2014-15

MT 221 COMPLEX VARIABLES AND PROBABILITY STATISTICS

Instruction	3 Periods per week
Duration of Main Examination	3 Hours
Main Examination	50 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Extension of Laplace transforms in solving the Integral equations
2. Introduction of the Concept of analyticity of complex functions and contour Integrations and conformal Mapping.
3. Introduction of Basic Probability, Probability distributions and sampling theory.

Course Outcomes:

1. Students must be able to apply the concepts learned in potential Theory, electromagnetic theory.
2. Students must realize the Probability & Statistics and its wide applications in various Branches of Engineering and science. Students must be able to analyze the Random phenomena of any Physical system.

UNIT-I: Applications of Laplace transforms to Integral equations:

Laplace transforms of special functions-Bessel function and error functions. Definitions of Integral transforms, kernel of the transform. Solution of Integral equations; Abel's integral equation, Integral equation of the convolution type and Integro-differential equations. Solutions of partial differential equations- Boundary value problems.

UNIT: II Complex Variables:

Analytic function, Cauchy Riemann equations (Cartesian and polar forms) - construction of Analytic functions. Harmonic function, derivatives of Analytic functions.

Complex line integrals, Cauchy's Integral theorem, Cauchy's Integral formula and its derivatives and problems related to the above theorems.

UNIT-III: Complex Variables:

Taylor's and Laurent's expansions-zeros, types of singularities and residues. Cauchy's Residue theorem. Evaluation of real definite integrals by Cauchy's residue theorem.

Elementary transformations and conformal Mapping.

UNIT-IV: Statistics and Basic Probability

Correlation -Correlation coefficient between two variables, Rank correlationand Regression- lines, random variables, distributions- probability mass function and probability density function. Conditional distributions-Bayes' Theorem-Mathematical expectation- expected values- moments and moment generating function- Characteristic function.

UNIT-V:Probability Distributions: Binomial, Poisson, and Uniform (rectangular), Normal, exponential, Gamma and Beta distributions. Test of hypothesis using Chi-square test for goodness of fit, t-test, F-test.

Text Books:

1. Mathematical Methods of Science and Engineering (Aided with MATLAB) By KantiB.Datta CENGAGE Learning.
2. Fundamentals of Mathematical Statistics by Gupta and Kapoor
3. Higher Engineering Mathematics by B.S.Grewal.

CS 221 COMPUTER ORGANIZATION

Instruction	4 Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

1. To understand the operation, interaction, communication among the functional units of a Computer System.
2. To understand the factors and trade-offs that affect computer performance.
3. To understand the concrete representation of data at the machine level and how computations are performed at the machine level.

Course Outcomes

1. Ability to understand the merits and pitfalls in computer performance measurements.
2. Ability to understand memory hierarchy and its impact on computer cost/ performance.
3. Technical knowledge of the advantage of instruction level parallelism and pipelining for high performance processor design.

UNIT-I

Introduction:

Von-Neumann Architecture, Computer Organization, Computer Architecture, Differences.

Register Transfer and Microoperations:

Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design:

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-Output and Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

UNIT-II

Microprogrammed Control:

Control Memory, Address Sequencing, Microprogram Example, Design of Control Unit.

Central Processing Unit:

General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).

UNIT-III

Pipeline and Vector Processing:

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

Computer Arithmetic:

Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations, Decimal Arithmetic Unit.

UNIT-IV

Input-Output Organization:

Input -Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication.

UNIT-V

Memory Organization:

Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.

Text Books:

1. M. Morris Mano, Computer System Architecture, 3rd Edition, Pearson Education Asia, 2002.
2. William Stallings, Computer Organization & Architecture, 6th Edition, Pearson Education Asia, 2003.

Suggested Reading:

1. V. Carl Hamacher, Z. G. Vranesic, S. G. Zaky, Computer Organization, Mcgraw Hill,2004.
2. Mehdi Zargham,Computer Architecture, Prentice Hall, 1996.
3. John L. Hennessy,David A. Patterson, Computer Architecture: A Quantitative Approach, 5th Edition, Morgan Kaufmann, 2006.

CS 222 Programming in JAVA

Instruction	4L+T Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Cover issues related to the definition, creation and usage of classes, objects and methods.
2. To expose and explain Java exception handling and Multi threading to the students.
3. Cover the basics of creating Java Collection Framework through programming.
4. To expose GUI programming and transfer data to and from computer files

Expected Learning Outcomes:

Upon completion of this class, students should be able to:

1. Identify classes, objects, members of a class and the relationships needed for a problem.
2. Create exception handling and Multithreading in Java programs.
3. Develop programs using the Java Collection API as well as the Java standard class library
4. To place GUI components and create files and read from computer files using Java

UNIT-1

Introduction: Introduction to java, Advantages of java.

Java Programming Fundamentals: Data Types, Variables, Arrays, operators, control statements, classes, methods, inheritance, packages and interfaces.

UNIT-2

Exception handling, Multi Threading, IO Basics, Reading console input and output, reading and writing files and String handling.

UNIT-3

Collections Overview, Interfaces, Classes, Iterators, Maps, Comparators, Legacy Classes and Interfaces, String Tokenizer, BitSet, Date, Calendar.

UNIT-4

Graphics Programming: Introduction to AWT Toolkit class Hierarchy, Frames, Panels, Canvases, Layout Managers,Color class,Font Class,Drawing Geometric Figures

Creating User Interfaces:Labels, Buttons, Text Fields, Text Areas, Check boxes, Checkbox Group, Choice control, Lists, Scrollbars, Menus Event Handling mechanisms, Delegation Event Modeling, Event listener Interfaces Applets,Mouse Events and key Events.

UNIT-5

IO Basics, Classes and Interfaces, Streams of Byte Classes, Character Streams, Serialization.

Text Books:

1. Herbert Schildt , The Complete Reference Java, 7th Edition, Tata McGraw-Hill 2007.
2. Herbert Schildt & Dale Skrien ,Java Fundamentals- A Comprehensive Introduction , 2013 Edition, Tata McGraw-Hill.

Suggested Reading :

1. C Thomas Wu ,An introduction to Object Oriented Programming with Java,5th Edition Tata McGraw Hill 2009.
2. Joe Wigglesworth and Paula McMillan ,Java Programming: Advanced Topics, 3rd Edition, Cenage Learning 2013 .
3. James M slack ,Programming and Problem Solving with JAVA, 1st Edition ,Thomson Learning 1999.

CS 223 **DATA COMMUNICATIONS**

Instruction	4 Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

1. To obtain insight about the basics of Data Communications and Networking.
2. To understand the fundamentals of data and signal transmission through guided and unguided media.
3. To gain knowledge about the layered communication architecture (OSI and TCP/IP) and its functionalities.
4. To understand the principles, protocols and transmission standards used in data link layer.
5. To obtain insight about wired and wireless LAN technology in today's communication world.

Course Outcomes

1. Understand the fundamental concepts of Data Communication and networking.
2. Able to describe communication protocols and layered network architectures.
3. Able to describe how the physical and data link layers operate in a typical data communication system.

UNIT-I

Introduction: Data Communications, Networks, The Internet, Protocols and Standards.
Network Models: Layered Task, OSI Model, Layers in OSI Model, TCP/IP Protocol Suite, Addressing.
Data and Signals: Analog and Digital, Periodic Analog Signal, Digital Signal, Transmission Impairments, Data Rate Limits, Performance.
Transmission Media: Guided Media, Unguided Media.

UNIT-II

Digital Transmission: Digital to Digital Conversion, Analog to Digital Conversion, Transmission Modes.
Bandwidth Utilization: Multiplexing, Spread Spectrum, Digital Subscriber line.
Switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Network.

UNIT-III

Error Detection and Correction: Introduction, Block Coding, Linear Block Codes, Cyclic Codes, Checksum.
Data Link Control: Framing, Flow and Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC.

UNIT-IV

Multiple Accesses: Random Access, Controlled Access, Channelization.
Connecting Networks: Connecting Devices, Backbone Network, Virtual LAN.
Virtual Circuit Network: Frame Relay, ATM, ATM LANs.

UNIT-V

Wired LANs: IEEE Standard, Standard Ethernet, Changes in the Standard, Fast Ethernet, Gigabit Ethernet.
Wireless LANs: IEEE 802.11, Bluetooth.
Wireless WANs: Cellular Telephony.

Text Books:

1. Behrouz A. Forouzan, Data Communication and Networking , 4th Edition, Tata McGraw Hill, 2006 .
2. William Stallings, Data and Computer Communication, 7th edition, Pearson Education, Asia 2004.

Suggested Reading:

1. 'Computer Networks' - A Top down approach Behrouz Forouzan, Firouz Mosharraf-Mcgrawhill,2011.

With effect from the academic year-2014-15

CS 224 PRINCIPLES OF PROGRAMMING LANGUAGES

Instruction	4 Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

1. To provide an introduction to formalisms for specifying syntax and semantics of programming languages
2. To provide an exposure to core concepts and principles in contemporary programming languages
3. To analyze and optimize the complexity of the programming languages.
4. To explore the concept of concurrent and parallel programming

Course Outcomes

1. Ability to program in different language paradigms and evaluate their relative benefits
2. Gains knowledge of, and ability to use, language features in current programming languages
3. Ability to develop algorithms for problem solving

UNIT – I

The Role of programming Languages: Towards Higher-level Languages, Programming Paradigms , Criteria for good language design and Language implementation.

Language Description : Expression notation , Abstract syntax tree, Context free Grammars

UNIT – II

Structured Programming : Need for Structured programming, Design considerations, Handling special cases in loops, Programming with invariants, Control flow in C.

Types – Role of Types, Basic Types, Arrays, Records, Unions, Sets, Pointers, Types and Error Checking.

Procedure Invocation: Introduction to Procedures, parameter passing methods, Scope Rules for Names, Nested Scopes, Activation Records.

UNIT – III

Object-Oriented Programming –Object**,** Object –oriented thinking , Classes in C++ - Over loading , Derived classes , Information hiding , Inheritance and polymorphism , Generic functions, Objects in Smalltalk.

Concurrent Programming – Parallelism in Hardware, Liveness properties, Synchronization, Concurrency in Ada.

UNIT – IV

Functional Programming - Introduction to LISP, Exploring a List, Functions as First-class values, ML: types, function, List manipulation, Exception Handling in ML, Storage allocation for lists

UNIT – V

Logic Programming - Computing with relations , Introduction to Prolog , Data structures in Prolog , Programming techniques , Control in Prolog , Cuts.

Text Books:

1. Ravi Sethi, "Programming Languages", II Ed., Pearson Education asia , 2001
2. Winston, LISP , 2nd edition, Pearson Education asia , 2001

Suggested Reading :

1. Robert W. Sebesta, "Concepts of Programming languages", 7th Edition., Pearson Education,2010
2. Daniel P. Friedman , Mitchell Wand, " Essentials of Programming Languages" , 3rd edition PHI ,2009.
3. Kenneth C.Louden "Programming Languages principles and Practice",2nd Edition, Cengage Learning 2003.

CS 225 MICROPROCESSORS & MICRO CONTROLLERS

Instruction	4 Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives

1. To understand Microprocessor types and Programming.
2. To understand various interfacing concepts.
3. To understand basic concepts of microcontroller 8051 and interfacing concepts**.**

Course outcomes

Students should be able to:

1. Identify the basic element and functions of microprocessor and microcontroller.
2. Describe the architecture of microprocessor and its peripheral devices.
3. Demonstrate fundamental understanding on the operation between the microprocessor and its interfacing devices.
4. Apply the programming techniques in developing the assembly language program for microcontroller application.

UNIT –I

8085 Architecture Introduction to microprocessors and microcontrollers, 8085 Processor Architecture, Internal operations, Instructions and timings.Programming,Introduction to 8085 instructions, Addressing modes and Programming techniques with Additional instructions

UNIT-II

Stacks and subroutines, interfacing peripherals- Basic interfacing concepts, Interfacing output displays, Interfacing input keyboards. Interrupts-8085 Interrupts, Programmable Interrupt Controller(8259A).Direct Memory Access(DMA)-DMA Controller(Intel 8257), Interfacing 8085 with Digital to Analog and Analog to Digital Converters.

Unit III

Interfaces : Programmable Peripheral Interface(Intel 8255 A), Programmable communication interface(Intel 8251), Programmable Interval Timer(Intel 8253 and 8254), Programmable Keyboard /Display controller(Intel 8279).

Unit IV

8086 Architecture and Instruction set: 8086 Block diagram, register structure, Minimum and Maximum mode operations, Addressing modes,Instruction set.Features of advanced processors 80386 , 80486, Pentium and Pentium-Pro Processors.

Unit V

Introduction to microcontrollers, 8051 architecture, Instruction set, Addressing modes, programming techniques. Interfacing of LCD, Stepper motor, ADC, DAC.

Text Books:

1. Ramesh S. Gaonkar, Microprocessor Architecture, Programming and Applications with 8085, 5th Edition, Prentice Hall, 2002.
2. Kenneth Ayala " The 8051 Microcontroller: 3rd Edition, Cengage Learning,2004.
3. Brey B.Brey, The Intel Microprocessor, 8086/8088,80186/80188,80286,80386,80486, Pentium and Pentium Pro-Processors-Architecture, Programming and interfacing 4th Edition, Prentice Hall, 1993

Suggested Reading:

1. Douglas Hall. "Microprocessor and Interfacing programming and Hardware", Tata Mc Graw Hill, Revised 2nd Edition,2007.
2. Liu, Gibson. "Microcomputer Systems: The 8086/88 family", 2nd Edition,2005.
3. Myke Predko, Programming and customizing the 8051 Microcontroller, Tata McGraw –Hill , 1994.
4. Mazidi M.A, Mazidi J.G & Rolin DMckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C,"2/e, Pearson Education, 2007.

CS 226 **JAVA LAB**

Instruction	3 Periods per week
Duration of Main Examination	3 Hours
Main Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:
1. Cover the basics of creating Java programming, Multi threading, Exception handling etc.
2. To expose GUI programming.

Course Outcomes:
1. Develop programs using the Java Concepts.
2. Small Applications Development using GUI and I/O Streams.

1. A program to illustrate the concept of class with constructors, methods and access levels .
2. A program to illustrate the concept of inheritance and polymorphism.
3. A program to illustrate the usage of abstract, final and static classes and methods.
4. A program to illustrate the concept of multi threading and thread synchronization.
5. A program to illustrate the concept of strings and stringtokenizer.
6. A program using ArrayList and LinkedLIst and iterator classes.
7. A program using TreeSet, HashSet and LinkedHashSet .
8. A program using Map Classes
9. A program using Enumeration and Comparator Interfaces
10. An application involving GUI with different controls, menus, Scrollbar and Event handling.
11. A program to implement Applet.
12. A program to illustrate the usage of all I/O Streams
13. A program to illustrate the usage of Serialization
14. Case Study using GUI and Threads.

Suggested Reading :

1. Herbert Schildt , java Fundamentals , Indian Edition,McGraw hill 2013.
2. Wigglesworth and Mcmillan ,Java Programming: Advanced Topics, 3rd Edition, Cenage learning 2013.

CS 227 **MICROPROCESSORS & MICRO CONTROLLERS LAB**

Instruction	3 Periods per week
Duration of Main Examination	3 Hours
Main Examination	50 Marks
Sessionals	25 Marks
Credits	3

Course Objectives

1. Familiarize the architecture of 8085 processor, assembly language programming and interfacing with various modules.
2. To understand 8051 Microcontroller concepts, architecture, programming and application of Microcontrollers.
3. To design & develop different type of embedded systems, industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.

Course Outcomes

1. Analyze and apply working of 8085.
2. Compare the various interface techniques. Analyze and apply the working of 8255, IC and design and develop the programs.
3. Analyze and apply working of 8051.
4. Analyze interfacing of various devices with microcontroller.

PART A : 8085 programming using microprocessor trainer kit

1. Simple programming examples using 8085 instruction set. To understand the use of various instructions and addressing modes.
2. Interfacing and programming of 8255(traffic light controller)
3. Interfacing and programming of 8255(seven segment display)
4. Interfacing and programming of 8255(led matrix display)

PART B: 8051 programming

1. Simple programming examples using 8051 microcontroller.
2. A/D converter interface
3. D/A converter interface
4. Stepper motor interface

Suggested Reading:

1. Ramesh S.Gaonkar, Microprocessor Architecture &Applications with 8085, 5th Edition, Prentice Hall,2002.
2. Kenneth Ayala " The 8051 Microcontroller: 3rd Edition, Cengage Learning,2004.
3. Mazidi M.A, Mazidi J.G & Rolin DMckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C,"2/e, Pearson Education, 2007.

WITH EFFECT FROM ACADEMIC YEAR 2015-16

Syllabus of B.E. III YEAR
OF
FOUR YEAR DEGREE COURSE
IN

COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)
Hyderabad – 500 075

Chaitanya Bharathi Institute of Technology (AUTONOMOUS)

SCHEME OF INSTRUCTION & EXAMINATION
B.E. III - year
COMPUTER SCIENCE & ENGINEERING

SEMESTER-I

Sl.No	Syllabus Ref. No	SUBJECT	Scheme of Instructions		Scheme of Examination			Credits
			Periods per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		Uni. Exam	Sessionals	
THEORY								
1	CS 311	Automata Languages and Computation	4	-	3	75	25	3
2	CS 312	Design and Analysis of Algorithms	4	-	3	75	25	3
3	CS 313	Embedded Systems	4	-	3	75	25	3
4	CS 314	Database Management Systems	4	-	3	75	25	3
5	CS 315	Operating Systems	4	-	3	75	25	3
6	CE 444	Human Values and Professional Ethics	2*	-	2	50	-	-
PRACTICALS								
6	CS 316	Embedded Systems Lab	-	3	3	50	25	2
7	CS 317	Database Management Systems Lab	-	3	3	50	25	2
8	CS 318	Operating Systems Lab	-	3	3	50	25	2
9	EG 221	Soft Skills and Employability Enhancement	-	2	2	50	25	1
		TOTAL	**22**	**11**	-	**625**	**225**	**22**

*21 Periods per semester

WITH EFFECT FROM ACADEMIC YEAR 2015-16

Chaitanya Bharathi Institute of Technology (AUTONOMOUS)

SCHEME OF INSTRUCTION & EXAMINATION
B.E - III Year
COMPUTER SCIENCE & ENGINEERING

SEMESTER-II

	Syllabus Ref. No	SUBJECT	Scheme of Instructions		Scheme of Examination			Credits
			Periods per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		Uni. Exam	Sessionals	
THEORY								
1	CS 321	Compiler Construction	4	-	3	75	25	3
2	CS 322	Software Engineering	4	-	3	75	25	3
3	CS 323	Web Technologies	4	-	3	75	25	3
4	CS 324	Computer Networks	4	-	3	75	25	3
5		Elective-I	4	-	3	75	25	3
PRACTICALS								
6	CS 326	Web Technologies Lab (Mini Project)	-	3	3	50	25	2
7	CS 327	Compiler Construction Lab	-	3	3	50	25	2
8	CS 328	Computer Networks Lab	-	3	3	50	25	2
9		Industrial Visit	-	14 Periods /Sem	-	-	-	-
		TOTAL	**20**	**9**	**-**	**525**	**200**	**21**

Elective-I:

CS 351 - Information Storage Management
CS 352 - Image Processing
CS 353 - Advanced Computer Architecture
CS 354 - Simulation and Modeling
CS 355 - Realtime Systems
CS 356 - Soft Computing

CS 311

AUTOMATA LANGUAGES AND COMPUTATION

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To introduce the students to the theoretical concepts of computer science
2. To know the various languages and grammars that are associated with various recognizers.
3. To understand the language by considering the idea of a decision problem
4. To understand language recognition problem and different classes of a problem

Course Outcomes:

1. Analyze the core concepts in automata theory and formal languages.
2. Design grammars and automata (recognizers) for different language classes.
3. Identify formal language classes and prove language membership properties.
4. Prove and disprove theorems establishing key properties of formal languages and computational models including (but not limited to) decidability and intractability.

UNIT-I

Automata: Introduction to Chomsky Hierarchy, Finite Automata, Central Concepts of Automata Theory. Finite Automata: An Informal Picture of Finite Automata, Deterministic Finite Automata, Non-deterministic Finite Automata, An Application, Finite Automata with Epsilon Transitions

UNIT-II

Regular expressions & Languages: Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions.
Properties of Regular Languages: Proving Languages not to be Regular, Closure properties of Regular Languages, Decision Properties of Regular Languages, Decision Properties of Regular Language, Equivalence and Minimization of Automata.

UNIT-III

Context Free Grammars and Languages: Context free grammars, Parses Trees, Right Linear and Left Linear Grammars Applications, Ambiguity in Grammars and Languages. Pushdown Automata: Definition, Languages of PDA, Equivalence of PDA'sand CFG's Deterministic Pushdown Automata.**Properties of Context Free Languages:** Normal Forms for ContextFree Grammars, Pumping Lemma.

UNIT-IV

Introduction to Turing Machines: Problems that Computers cannotSolve, The Turing machines, Programming Techniques for Turing Machines,Extensions to the Turing 4 Machines Restricted Turing Machines, Turingmachines and Computers.

UNIT-V

Un-decidability: A language that is not Recursively Enumerable, Anundecidable problem that is RE, Undecidable problems about TuringMachines, Post's Correspondence Problem, Other Undecidable Problems.**Intactable Problems:** The Classes P and NP, an NP Complete Problem, A Restricted Satisfiability problem.

Text Books:

1. John. E. Hopcroft, Rajeev Motwani, Jeffery, D. Ulman, "Introductionto Automata Theory, Languages and Computation", 3rd edition,Pearson Education-2007.
2. John C.Martin, "Introduction to Languages and the Theory ofComputation", 3rd edition Tata McGraw Hill, 2003.

Suggested Readings:

1. -Mishra and Chandrashekaran, "Theory of Computer Science – Automata languages and computation", 2nd edition, PHI.

CS 312

DESIGN AND ANALYSIS OF ALGORITHMS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To provide an introduction to formalisms, understand, analyze and denote time complexities of algorithms.
2. To introduce the different algorithmic approaches for problem solving through numerous example problems.
3. To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness.

Course Outcomes:

1. Students will be able to develop an overall understanding of the performance of algorithms.
2. Students will be able to analyse and determine an algorithm's time complexity.
3. Students will be able to devise an appropriate algorithm for real world problem, using one of the algorithmic approaches.

UNIT-I

Introduction, Algorithm Specification, Performance analysis, SpaceComplexity, Time Complexity, Asymptotic Notation(O,Omega, Theta),Practical Complexities, Performance Measurement, Review of elementary data structures- Heap and Heap Sort, Hashing, Set representation: UNION and FIND.

UNIT-II

Divide-and Conquer: The general method, finding maximum and minimum, Merge sort, quick sort and selection. **Greedy Method:** Knapsack problem, Optimal Storage on tapes, Job sequencing with deadlines, Optimal merge patterns, Minimum Spanning Trees.

UNIT-III

Dynamic Programming And Traversal Techniques: Multistage graph, All Pair Shortest Paths, Optimal Binary Search trees,0/1 Knapsack, Reliability Design, Travelling Salesman Problem, BFS and Depth First Search: Applications of BFS and DFS. Bi-Connected components, transitive closure, topological sorting, strongly connected components.

UNIT-IV

Backtracking and Branch and Bound: 8-Queens Problem, Graph Coloring, Hamiltonian cycle, 0/1 Knapsack Problem, Traveling salesperson problem. Lower-Bound Theory.

UNIT-V

NP-Completeness: Basic concepts, Polynomial time, polynomial time verification, reducibility, **NP-complete problems:** The clique problem, the vertex-cover problem, the Hamiltonian cycle problem, the traveling salesman problem and the subset sum problem.

Text Books:

1. Horowitz E.,Sahani S, “Fundamentals of Computer Algorithms”,Galgotia Publications.
2. Cormen, Leiserson, Rivest,Stein, “Introduction to Algorithms”, Second Edition, PHI Learning.

Suggested Reading:

1. Aho, Hopcroft, Ulman, "The Design and Analysis of Computer Algorithms", Pearson Education, 2000.

CS 313

EMBEDDED SYSTEMS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Emphasis on hardware and software in the design and development of Embedded Systems.
2. To study the principles and concepts of Embedded System architecture, hardware design and development.
3. The concepts and theory necessary to understand and program Distributed Embedded real-time systems.
4. The concepts of RTOS and various issues involved in Real Time Operating System.

Course Outcomes:

1. Analyze the core concepts of Embedded System and Embedded System Architecture.
2. Design and develop Embedded System hardware and software using Embedded C.
3. Analyze the operating system for Embedded Systems and Embedded System development environment.

UNIT – I

Introduction to Embedded Systems: Embedded Systems, Processor embedded into a system, Embedded hardware units and devices in a system, Embedded software in a system, Examples of embedded systems, Design process in Embedded system, Formalization of system design, Design process and design examples(smart card, digital camera, mobile phone), Classification of Embedded Systems, Skills required for embedded system designer.

UNIT-II

Programming concepts and Embedded programming in C: Software programming in Assembly language and in high level language C, C program elements: Header and source files, preprocessor directives, program elements, macros and functions, program elements: data types, data structures, modifiers, statements, loops and pointers.

Interprocess communication and synchronization of processes, Threads and Tasks.

Multiple processes in an application, Multiple threads in an application, Tasks , Task states, Task and data, Clear cut distinction between functions, ISRs and tasks and their characteristics.

Concept of semaphores, Shared data, Interprocess communication, Signal function, Semaphore functions, Message queue functions, Mailbox functions, Pipe functions, Socket functions, RPC functions.

UNIT-III

Real time operating systems: OS services, Process management, Timer functions, Event functions, Memory management, Device, File, IO subsystems management, Interrupt routine in RTOS environment and handling of Interrupt source calls, RTOS, RTOS task scheduling models, Interrupt latency, Response of tasks as performance metrics, OS security issues.

UNIT-IV

8051 interfacing with displays (LED, 7 segment display, LCD), Switch, Relay , Buzzer, D/A and A/D converters, Stepper motor.

Real time OS programming-I: Micro C/OS –II and Vx works, Basic functions and types of RTOSes, RTOS Micro COS-II, RTOS Vxworks, Basic features.

Networked Embedded systems, Serial communication protocols , I2C bus, CAN bus, RS232, Introduction to advanced architectures: ARM and SHARC .

UNIT-V

Embedded software Development process tools: Introduction to embedded software development process and tools, Host and Target machines, Linking and locating software, Getting embedded software into target system, Issues in hardware - software design and Co-design.

Testing, simulation and debugging techniques and tools: Testing on host machine, Simulators, Laboratory tools

Text Books:

1. Raj Kamal, "Embedded Systems: Architecture, Programming And Design", Second Edition 2008, The McGraw-Hill Companies.

Suggested Reading:

1. David E. Simon, "An Embedded Software Primer", Pearson Education, 1999.
2. Wayne Wolf , "Computers as Components: Principles of Embedded Computing System Design", Elsevier, 2008.

CS 314

DATABASE MANAGEMENT SYSTEMS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To familiar with fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
2. To understand about data storage techniques and indexing.
3. To impart knowledge in transaction Management, concurrency control techniques and recovery procedures.

Course Outcomes:

1. Students will be able to develop the knowledge of fundamental concepts of database management
2. Students will be able to apply the concepts like data storage and indexing.
3. Students will be able to implement the knowledge about transaction management, concurrency control and recovery of database systems.

UNIT-I

Introduction : Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Design, Specialty Databases, Data Storage and Querying, Database Users and Administrators Database System Architecture, Application Architectures.

Database Design and E-R Model: Overview of the Design Process, Data Models, The E-R Model, Constraints, E-R Diagrams, E-R Design Issues, Extended E-R Features, Reduction to Relation Schemas, Other Aspects of Database Design.

UNIT-II

Relational Model: Structure of Relational Databases, Database Schema, Keys, Relational Algebra, Fundamental Operations, Additional Relational Algebra Operations, Extended Relational Algebra Operations, Modification of the Database.

Structured Query Language: Overviews, SQL Data Types, Basic Structure of SQL Queries, Modification of the Database, Set Operations, Aggregate Functions, Data-Definition Language, Integrity Constraints, Null Values, Nested Sub queries, Views, Join Expression. Triggers, Index Definition in SQL, Procedures and Functions in SQL, Recursive Queries, JDBC,ODBC, Embedded SQL.

UNIT-III

Relational Database Design: Undesirable Properties in Relational Database Design, Functional Dependencies, Basic Definitions, Trivial and Nontrivial Dependencies, Closure of Set of Functional Dependencies, Closure of Set of Attributes, Irreducible Set of Functional Dependencies, Non-loss Decomposition and Functional Dependencies, Normalization – 1NF,

2NF, and 3NF, Dependency Preservation, BCNF, Comparison of BCNF and 3NF, Multi-valued Dependencies and 4NF, Join Dependencies and 5NF.
Indexing: Overview of Indexes, Properties of Indexes, Tree-Structured Indexing, Indexed Sequential Access Method (ISAM), B+ Tree Index Files, Bitmap Indices.

UNIT-IV
Hashing: Static Hashing, Dynamic Hashing - Extendible Hashing, Linear Hashing.
Transaction Management and Concurrency Control: Transaction Concept – ACID Properties, States of Transaction, Implementation of Atomicity and Durability, Concurrent Executions - Serializability, Recoverability, Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularity.

UNIT-V
Deadlocks: Deadlock Prevention, Deadlock Detection, Performance of Lock-Based Concurrency Control, Specialized Locking Techniques - Dynamic Databases and the Phantom Problem.
Recovery System: Failure Classification, Storage Structure, Recovery and Atomicity, Log-Based Recovery, Buffer Management, Failure with Loss of Nonvolatile Storage, ARIES Recovery Method, Remote Backup Systems.

Text Books:

1. Abraham Silberschatz, Henry F Korth, S Sudarshan, " Database System Concepts", Sixth Edition, McGraw-Hill International Edition, 2011
2. Date CJ, Kannan A, Swamynathan S, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.

Suggested Reading:

1. Raghu Ramakrishnan, JohnnesGehrke, "Database Management Systems" ,Third Edition, McGraw Hill,2003.
2. RamezElmasri, Durvasul V L N Somayazulu, Shamkant B Navathe, Shyam K Gupta, "Fundamentals of Database Systems", Fourth Edition, Pearson Education,2006.

CS 315

OPERATING SYSTEMS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To understand the services an operating system provides to users, processes and other systems
2. To understand how to manage various resources like CPU, Memory, Files and I/O.
3. To understand Process Synchronization, multiprogramming, Deadlocks.
4. To understand the Architecture and implementation of different operating systems.

Course Outcomes:

1. Students will be able to develop the knowledge of the role of operating system and its design.
2. Students will be able to implement the knowledge of multiprogramming, multithreading, deadlocks.
3. Students will be able to analyse the concept of IPC
4. Students will be able to realize the concept of I/O, file management and possess the knowledge about new evolving operating systems and their features.

UNIT-I

Introduction: What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations

Operating-System Structures: Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation Operating-System Structure, Virtual Machines, Operating-System Debugging Operating-System Generation System Boot.

UNIT-II

Process Management: Processes, Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication, Examples of IPC Systems , Communication in Client – Server Systems.

Threads Overview, Multithreading Models, Threading Issues

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms,Thread Scheduling, Multiple-Processor Scheduling.

Process Synchronization: Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization , Synchronization Examples , Atomic Transactions.

UNIT-III

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

MEMORY MANAGEMENT: Main Memory, Background, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation.
Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory.

UNIT-IV
File-System Interface: File Concept, Access Methods, Directory and Disk Structure, File-System Mounting, File Sharing, Protection
File-System Implementation: File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance Recovery.
Mass-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure, Stable-Storage Implementation, Tertiary-Storage Structure

UNIT-V
I/O Systems: Overview, I/O Hardware, Application I/O Interface, Transforming I/O Requests to Hardware Operations
Protection and Security: Protection, Goals of Protection, Principles of Protection , Domain of Protection,Access Matrix, Implementation of Access Matrix, Access Control , Revocation of Access Rights, Capability-Based Systems , Language-Based Protection
Security: The Security Problem , Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication , Implementing Security Defenses , Firewalling to Protect Systems and Networks, Computer-Security Classifications

Text Books:

1. Avi Silberchatz, Peter B. Galvin, Greg Gagne, "Operating System-Concepts", John Wiley & sons, Eighth Edition, 2008
2. Andrew S.Tanenbaum, "Modern Operating Systems", Third Edition, Pearson education, Asia-2008

Suggested Reading:

1. W.Richard Stevens; Stephen A.Rago, "Advanced Programming in the UNIX Environment", Third Edition, Addison-Wesley professional Publication Date:14-MAY-2013

CE 444

HUMAN VALUES AND PROFESSIONAL ETHICS

Instruction	21L Periods per semester (7 * 3)
Duration of University Examination	2 Hours
University Examination	50 Marks
Sessionals	-
Credits	-

Course Objectives:

1. To develop the critical ability among students to distinguish between what is of value and what is superficial in life
2. To enable the students understand the values, the need for value adoption and prepare them meet the challenges
3. To enable the students develop the potential to adopt values, develop a good character and personality and lead a happy life
4. To motivate the students practice the values in life and contribute for the society around them and for the development of the institutions /organization around they are in.
5. To make the students understand the professional ethics and their applications to engineering profession

Course Outcomes:

1. Students develop the capability of shaping themselves into outstanding personalities, through a value based life.
2. Students turn themselves into champions of their lives.
3. Students take things positively, convert everything into happiness and contribute for the happiness of others.
4. Students become potential sources for contributing to the development of the society around them and institutions / organisations they work in.
5. Students shape themselves into valuable professionals, follow professional ethics and are able to solve their ethical dilemmas.

UNIT-I

Concepts and Classification of Values –Need and challenges for value Adoption Definition of Values – Concept of Values – Classification of Values – Hierarchy of Values – Types of values –Espoused and Applied Values – Value judgement based on Culture – Value judgement based on Tradition – Interdependence of Values.

Need for value education – Findings of Commissions and Committees - Corruption and illegal practices – Science and Technology without values- Exploitation of nature – Increasing use of violence and intoxicants – Lack of education in values – Implications of education in values – Vision for a better India.

Challenges for Value adoption – Cultural, Social, Religious, Intellectual and Personal challenges.

UNIT-II

Personal Development and Values in Life

Personal Development: Enlightened self-interest – Accountability and responsibility – Desires and weaknesses – Character development – Good relationships, self-restraint, Spirituality and Purity – The quest for Character – Tests of Character – The key to good character.
Values in Life: Building an ethical policy – Integrating values in everyday life – Archaic Social Values – Parenting practices – Critical Thinking - Analyzing and Prioritizing values – Practicing Yoga and Meditation

UNIT-III

Practicing Values for the development of Society

Resentment Management and Self-analysis – Positive Thinking and Emotional Maturity – The importance of Women , Children and Taking care of them – Helping the poor and needy – Fighting against addictions and atrocities – Environmental awareness – Working for the Sustainable development of the society.
Values in Education system: Present Scenario- Engineering education –Current trends- Need for quality improvement- Adoption of value education – Principles of Integrity-Institutional Development.

UNIT-IV

Basic Concepts of Professional Ethics

Ethics, Morals and Human life , Types of Ethics, Personal Ethics, Professional ethics, Ethical dilemmas, Indian and Global thoughts on ethics, Profession, Professional and Professionalism, Ethical role of a professional Basic ethical principles, Some basic ethical theories, use of ethical theories.
Science, Religion Ethics, Genders and ethics, Media and ethics, Computer Ethics, Case Studies on Professional Ethics, Exemplary life sketches of prominent Indian personalities

UNIT-V

Ethics in engineering profession

Engineering profession-Technology and Society-Engineering as Social Experimentation-Engineering ethics-Ethical obligations of Engineering Professionals-Role of Engineers-Engineers as Managers-Professional responsibilities of Engineers- Engineers Responsibility for Safety- A few Case Studies on Risk management
Conflicts of Interest- Occupational Crimes- Plagiarism-Self plagiarism-Ethics Audit-Consideration for ethics audit-Ethics Standards and Bench Marking

Text Books:

1. Subramanian R., "Professional Ethics" , Oxford University Press , 2013
2. Nagarajan R.S., "A Text Book on Human Values and Professional Ethics" New Age Publications, 2007
3. Dinesh Babu S., "Professional Ethics and Human Values" , Laxmi Publications , 2007

Suggested Readings:

1. Santosh Ajmera and Nanda Kishore Reddy "Ethics, Integrity and Aptitude", McGrawhill Education Private Limited , 2014
2. Govinda Rajan M., Natarajan S., Senthil Kumar V.S. "Professional Ethics and Human Values" Prentice Hall India Private Limited, 2012
3. Course Material for Post Graduate Diploma In "Value Education & Spirituality" Prepared by Annamalai University in Collaboration with Brahma Kumaris, 2010

CS 316

EMBEDDED SYSTEMS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. Understanding of Embedded Systems and learn programming in Embedded C.
2. To analyze and design various Microcontroller applications and interfacing.
3. Understanding and analyzing RTOS characteristics.
4. To learn how to write simple applications using RTOS.

Course Outcomes:

1. Apply knowledge of 8051 microcontroller and interface with various devices.
2. Demonstrate serial communication using IIC protocol.
3. Develop RTOS programs to implement various applications.
4. Learn to integrate hardware and software to come up with an Embedded System.

Using 8 bit microcontroller, following programs have to be tested on 89C51 Development board/equivalent using Embedded C Language on RIDE IDE and Proload or Equivalent.

A) Interface Input, Output and other units such as: Relays, LEDs, LCDs, Switches, Keypads, Stepper Motor, Sensors, ADC, DAC, Timers:

1. Program to interface a Leds, Buzzer and Switch to different pins of a Port such that the buzzer and leds should work as long as the switch is pressed.
2. Program to interface relay
3. Program to interface LCD in four bit mode and 8 bit mode to display message on it.
4. Program to interface Seven Segment display unit.
5. Program to interface Stepper Motor to rotate the motor in clockwise and anticlockwise directions.
6. Program to illustrate timer interrupt.
7. Program to implement Analog to Digital conversion using ADC0808 and Digital to Analog conversion using DAC0808.

B) Demonstrate Communications using IIC protocol:

8. Program to interface Real Time Clock and EEPROM using software implemented IIC protocol

RTOS: Understanding Real Time Concepts using any RTOS through demonstration of:

9. Program to create Tasks.
10. Program to illustrate producer consumer problem using Semaphores.
11. Program to illustrate Queues.
12. Program to illustrate Timer.

Suggested Readings:

1. Wayne Wolf , “Computers as Components: Principles of Embedded Computing System Design”, Elsevier, 2008.

CS 317

DATABASE MANAGEMENT SYSTEMS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1 To familiar with the concepts of structured query language.
2 To understand about programming language/ structured query language (PL/SQL).
3 To familiar with generation of form and open database connectivity.

Course Outcomes:

1 Students will be able to develop the knowledge of structured query language concepts.
2 Students will be able to Implement the concepts of PL/SQL.
3 Students will be able to design GUI using forms and implement database connectivity.

List of Experiments:

SQL

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
2. Queries using operators in SQL
3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update
4. Queries using Group By, Order By, and Having Clauses
5. Queries on Controlling Data: Commit, Rollback, and Save point
6. Queries to Build Report in SQL *PLUS
7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints
8. Queries on Joins and Correlated Sub-Queries
9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

PL/SQL

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation
11. Write a PL/SQL Code Bind and Substitution Variables.
    Printing in PL/SQL
12. Write a PL/SQL block using SQL and Control Structures in PL/SQL
13. Write a PL/SQL Code using Cursors, Exceptionsand Composite Data Types
14. Write a PL/SQL Code using Procedures, Functions, and Packages

FORMS

15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc.

16. Demonstration of database connectivity

Note: The creation of sample database for the purpose of the experiments is expected to be pre-decided by the instructor.

Text Books/Suggested Reading:

1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah, "Database Systems Using Oracle", PHI,2007.
3. Rick F Van der Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007.

CS 318

OPERATING SYSTEMS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. To understand the design aspects of operating system.
2. To design and apply the process management concepts.
3. To design and apply the storage management concepts.

Course Outcome:

1. Students will be able to use Unix utilities and perform basic shell control of the utilities
2. Students will be able to use the Unix file system and file access control.
3. Students will be able to write programs systems based on multiple cooperating processes or threads
4. Students will be able to implement process scheduling, synchronization and memory management algorithms.

List of experiments:

1. Programs using LINUX shell scripts.
2. Programs using process related system calls.
3. Programs to illustrate threads
4. Implement CPU scheduling algorithms (a) Round Robin (b) SJF (c) FCFS
5. Echo server using pipes
6. Echo server using messages
7. Producer- Consumer problem using shared memory.
8. Dining philosopher problem using semaphore
9. Implement page replacement algorithms (a) FIFO (b) LRU
10. Bankers algorithm for Deadlock detection and avoidance
11. Programs to illustrate different file related System calls.
12. Printing file flags for specified descriptor.

Suggested Reading:

1. Deitel and Deitel, "Operating System", Pearson Education, New Delhi, Third Edition, 2007.

EG 221

SOFT SKILLS AND EMPLOYABILITY ENHANCEMENT

Instruction	2 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	1

Course Objectives: To help the students

1. Participate in group discussions with confidence and to make effective presentations. Also to learn the art of communication.
2. With-resume packaging, preparing and facing interviews.
3. Build an impressive personality through effective time management & goal setting, self confidence and assertiveness.
4. Understand what constitutes proper grooming and etiquette in a professional environment. Also to understand academic ethics and value systems.

Course Outcomes: Student will be able to

1. Be effective communicators and participate in group discussions with confidence. Also be able to make presentations in a professional context.
2. Write resumes, prepare and face interviews confidently.
3. Be assertive and set short term and long term goals. Also learn to manage time effectively and deal with stress.
4. Make the transition smoothly from campus to corporate. Also use media with etiquette and know what academic ethics are.

Exercise 1

Communicative Competence –The Art of Communication, basic grammar, Indianisms, Effective listening skills, using English in different situations

Exercise 2

Group Discussion –dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence

Elements of effective presentation –Structure of presentation –Presentation tools –Body language Creating an effective PPT

Exercise 3

Interview Skills –Resume' writing –structure and presentation, planning, defining the career objective, projecting ones strengths and skill – sets Interview Skills –concept and process, pre-interview planning, opening strategies, answering strategies, mock interviews

Exercise 4
Personality Development –Effective Time Management, setting realistic goals, self confidence and assertiveness, stress management, moral values.

Exercise 5
Corporate Culture –Grooming and etiquette, communication media etiquette Academic ethics and integrity

Text Books/Suggested Reading:

1. Madhavi Apte , "A Course in English communication", Prentice - Hall of India, 2007
2. LeenaSen , "Communication Skills", Prentice Hall of India, 2005
3. Dr. Shalini Verma, "Body Language - Your Success Mantra", S Chand, 2006
4. Edgar Thorpe and Showick Thorpe , "Objective English", 2nd edition, Pearson Education, 2007
5. Ramesh, Gopalswamy, and Mahadevan Ramesh, "The ACE of Soft Skills", New Delhi: Pearson, 2010
6. Gulati and Sarvesh, " Corporate Soft Skills", New Delhi: Rupa and Co. , 2006
7. Van Emden, Joan, and Lucinda Becker, "Presentation Skills for Students", New York: Palgrave Macmillan, 2004
8. Covey and Stephen R, "The Habits of Highly Effective People", New York: Free Press, 1989.

II-SEMESTER

CS 321

COMPILER CONSTRUCTION

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives :

1. To implement the concept learned in automata theory and languages to the field of Computer Science.
2. To understand the processes involved in converting a source language to target code
3. To expose the students to the analysis and synthesis phases of compilation
4. To build a compiler at the end of the course

Course Outcomes:

1. Design & implement a software system for the compiler.
2. Deal with different translators.
3. Apply the knowledge of lex tool &yacc tool to develop a scanner & parser.
4. Design & conduct experiments for analysis and synthesis phases of compilation.

UNIT-I

Introduction – Programs related to compilers. Translation process.Majordata structures.Other issues in compiler structure. Boot strapping andporting.**Lexical analysis** – The role of Lexical Analyzer.Input Buffering.Specification of Tokens.Recognition of Tokens.The Lexical-AnalyzerGenerator Lex.

UNIT-II

Syntax Analysis – Introduction. Top-Down parsing, Brute Forcing,Recursive Descent, Predicative LL(1), Bottom-Up parsing : Introductionto LR Parsing, Powerful LR parsers SLR, CALR, LALR, UsingAmbiguous Grammars, Parser Generators - Yacc.

UNIT-III

Syntax Directed Translation – Syntax Directed Definitions. EvaluationOrders for SDDs. Applications of Syntax Directed Translation.

Symbol Table Organization - Structure of Symbol table, Symbol Tableorganization for Block Structured and non-block Structure languages, Data
Structures of symbol Table.

UNIT-IV

Intermediate code generation : Variants of syntax trees. Three-AddressCode, Types and Declarations.Translation of Expressions.Type Checking.Control Flow.

Storage Organization. Stack Allocation of Space. Access to Non localData on the Stack.Heap Management.Introduction to GarbageCollection.

UNIT-V

Code Generation – Issues in the Design of a Code Generator.TheTarget Language. Addresses in the Target Code Basic Blocks and FlowGraphs. Optimization of Basic Blocks.Peephole Optimization. RegisterAllocation and Assignment. Machine Independent Optimizations – ThePrincipal Sources of Optimizations, Introduction to data flow analysis,Foundation of data flow analysis.

Error Recovery : Introduction, Error detecting and Reporting in variousPhases, Lexical Errors, Syntax Errors handling, and error Recovery invarious Phases.

Text Books:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman, "Compilers: Principles Techniques & Tools", Pearson Education2nd Edition 2007.
2. Keith D Cooper & Linda Tarezon, "Engineering a Compiler", MorganKafman, Second edition.Lex&Yacc, John R Levine, Tony Mason, Doug Brown, ShroffPublishers.

Suggested Reading:

1. Kenneth C Louden, "Compiler Construction: Principles andPractice", Cengage Learning. Lex&Yacc, John R Levine, Oreilly Publishers.

CS 322

SOFTWARE ENGINEERING

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To familiarize students with software development process.
2. To learn software quality assessment.
3. To learn testing for optimum functionality at reasonable cost.
4. To understand the merits and demerits of different approaches in software engineering.

Course Outcomes:

After completion of this course, student will be able to

1. Analyze various software engineering models and patterns generally used.
2. Choose the best model for the project based on the type of project.
3. Perform quality assessment testing on the software and measure the quality using various metrics.
4. Perform testing through various techniques to make sure the software project is optimal and to achieve this at a reasonable cost.

UNIT –I

Introduction to Software Engineering: Theevolvingrole of Software, changing nature of Software, Software Myths .

Generic view of Process: Software Engineering, Process Framework, CMMI, Process Patterns, Process Assessment, Personal and Team Process, Process Technology, Product and process.

Process Models: Perspective Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process.

An Agile View of Process: What is Agility, Agile Process, and Agile Process Models.

UNIT-II

Requirement Engineering: A bridge to design and construction, Requirement Engineering tasks, Initiating Requirement Engineering Process, Eliciting Requirement, Developing Uses cases, Building the Analysis Model, Negotiating Requirements, Validating Requirements.

Planning and Managing the Project: Tracking Progress, Project Personnel, Effort Estimation, Risk Management, the Project Plan, Process Models and Project Management.

UNIT-III

Building the Analysis and Design Model: Requirements Analysis Modeling approaches, Data modeling concepts, Object oriented analysis , Scenario based modeling, Flow oriented modeling, Class-based modeling, Creating a Behavioral Modeling. Design within the context of SE, Design Process and Design quality, Design concepts, The Design Model, Pattern-based Software Design.

Creating Architectural Design: Software architecture, Data design, Architectural Styles and Patterns, Architectural Design.

UNIT-IV

Modeling Component-Level Design: What is a Component, Designing Class-Based components, Conducting Component–level Design, Object Constraint Language, Designing Conventional Components.

Performing User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

Implementation: Coding Principles and Standards, Coding Process, Code Verification .

UNIT-V

Testing Strategies: A Strategic approach to software testing, strategic issues, test strategies for O-O software, validation testing, system testing, art of debugging.

Testing Tactics: Software Testing Fundamentals, Black-Box and white box Testing, basis path testing, Control Structure Testing, O-O Testing methods.

Product Metrics: Software quality, A framework for product metrics, Metrics for the analysis model, metrics for the Design model, metrics for source code, Metrics for Testing.

Software Maintenance: Categories of Maintenance, Maintenance Process models,Software reuse, Metrics for maintenance.

Text Books:

1. Roger S. Pressman, "Software Engineering –A Practitioners Approach", 7th Edition, Pearson Education, India, 2010.
2. Shari Lawrence Pfleeger, "Software Engineering Theory and Practices" 4th Edition - Pearson Education, India, 2011.

Suggested Reading:

1. UgrasenSuman"Software Engineering concepts and Practices", Cengage Learning,2013.

CS 323

WEB TECHNOLOGIES

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To acquire knowledge ofXHTML,Java Script and XML to develop web applications
2. Ability to develop dynamic web content using Java Servlets and JSP
3. To understand JDBC connections and Java Mail API
4. To understand the design and development process of a complete web application

Course Outcomes:

1. Students will be able to develop static web sites using XHTML and Java Scripts
2. To implement XML and XSLT for web applications
3. Develop Dynamic web content using Java Servlets and JSP
4. To develop JDBC connections and implement a complete Dynamic web application

UNIT-I

Web Basics and Overview: Introduction to Internet, World Wide Web, URL, MIME, HTTP Introduction and basics of XHTML, Cascading Style Sheets, Basics of JavaScript

UNIT-II

Event handling and Dynamic Documentation with Java Scripts
Introduction to XML, XML document structure, DTD, namespaces, Schemas. XSLT style sheets, XML Processors.

UNIT-III

J2EE Platform: Enterprise Architecture Styles, Containers and Technologies
Servlet Programming: Overview of Java Servlet API, Servlet Implementation, Servlet Configuration, Servlet Exceptions, Servlet Life cycle, Request and Responses.
Introduction to Web containers: Web Application Structure, Mapping requests to Applications and Servlets, Securing web Applications and Deployment configuration
Servlet Sessions, Context and Collaboration: Approaches to Session tracking, Session Tracking with java servlet API, Servlet Context, Servlet Collaboration.

UNIT-IV

Filters for web applications: Introduction to filters, filter API, Deployment descriptor for filters, chat applications with filters.
JSP Basics: Introduction to JSP, Directives, Scripting Elements, Standard Objects, Design Strategies.
JSP Tag extensions: Tag extensions, A simple Tag Anatomy of a Tag extension, Writing Tag Extensions, Application Life Cycle Events.

UNIT-V

Java Database Connection: Introduction to JDBC, Database Drivers, Interfaces and classes of java.sql package. Retrieving Meta information from database and ResultSet, JDBC Data Sources, Connection pooling, Distributed transactions and RowSet objects.

Java Mail: Mail Protocols, Overview, Installation and Configuration,API ,Working with Mail and Resources.

Text Books:

1 SubramanyamAllamraju, "Professional Java Server programming", J2EE 1.3 Edition, CeditBuest, Apress Publications.

2 Robert W Sebesta, "Programming the World Wide Web", Pearson Education

Suggested Reading:

1. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2010.

CS 324

COMPUTER NETWORKS

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Understanding the concepts of network reference models
2. Analysis of Routing algorithms and congestion algorithms
3. Functionality of the transport layer
4. Basics of cryptography and different application layer protocols

Course Outcomes:

After completion of this course, student will be able to

1. Deter main the ISO-OSI and TCP/IP Models
2. Design applications using internet protocols
3. Implement routing and congestion control algorithms
4. Develop application layer protocols

UNIT-I

Introduction: Network Architecture, Protocol implementation issues, Quantitative performance metrics, Network Design, Reference Models- ISO-OSI and TCP/IP, Comparison of the OSI and TCP/IP models.

UNIT-II

Network Layer: Network layer design issues, Routing Algorithms, Congestion Control Algorithms

Internetworking: The network layer in the internet, Internet Protocol (IP), Unicast, Multicast, and inter Domain Routing, QOS in IP.

UNIT-III

Transport Layer: Elements of transport Protocol, Congestion Control, Performance issues, Transmission Control Protocol (TCP), Remote Procedure Call (RPC)- Implementation semantics of RPC, Client server applications. Real-time Transport Protocol (RTP), Multimedia applications, Congestion control and resource allocation, congestion control in TCP and UDP.

UNIT-IV

Application Layer: Domain Name Server, World Wide Web- HTTP, Presentation formatting and Data Compression, Network Security- Cryptographic tools, the problems of key distribution, General Authentication techniques, PGP, SSH, IPSEC and Firewalls

UNIT-V

Network Application and Protocols: File Transfer Protocol, email and the Web, Multimedia applications such as IP telephony, Video streaming, Overlay Networks like peer-to-peer file

sharing and Content Distribution Networks (CDN), Web Services architectures for developing new application protocols

Text Books:

1. Larry L Peterson, Bruce S Davis, "Computer Networks", 5th Edition, Elsevier, 2012.
2. Andrew S. Tannenbaum, David Wetherall "Computer Networks", 5th Edition, Pearson Edu, 2010.

Suggested Reading:

1. Forouzon, "Computer Networks and communication – Top down Approach", 5thEdition, 2013.

CS 351

INFORMATION STORAGE AND MANAGEMENT

(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives:

1. Evaluate storage architectures; understand logical and physical components of a storage infrastructure including storage subsystems, RAID and intelligent storage systems.
2. Describe networking technologies such as FC-SAN,NAS, IP-SAN and data archival solution - CAS.
3. Identify different storage virtualization technologies, backup technologies and their benefits.
4. Understand and articulate business continuity solutions including, backup technologies, and local and remote replication solutions, information security, and storage security domains.

Course Outcomes:

1. Describe and apply storage technologies.
2. Identify leading storage technologies that provide cost-effective IT solutions for medium to large scale businesses and data centers.
3. Describe important storage technologies, features such as availability, replication, scalability and performance.
4. Manage virtual servers and storage between remote locations, design, analyze and manage clusters of resources, desing, analyze and manage clusters of resources.

UNIT-I

Storage System: Introduction to information storage, virtualization and cloud computing, Key data center elements, Compute, application, and storage virtualization, Disk drive & flash drive compnents and performance, RAID, Intelligent storage system and storage provisioning (including virtual provisioning).

UNIT-II

Storage Networking: Fibre Channel SAN components, FC protocol and operation, Block level storage virtualization, iSCSI and FCIP as an IP-SAN solutions, Converged networking option – FcoE, Network Attached Storage (NAS) – components, protocol and operation, File level storage virtualization, Object based storage and unified storage platform.

UNIT-III

Backup, Replication, Archive: Business continuity terminologies, planning and solutions, Clustering and multi-pathing architecture to avoid single points of failure, Backup and recovery – methods, targets and topologies, Data de-duplication and backup in virtualized environment, Fixed content and data archive, Local replication in classic and virtual environments, Remote

replication in classic and virtual environments, Three-site remote replication and continuous data protection.

UNIT-IV

Cloud Infrastructure: Cloud Enabling Technologies, Characteristics of Cloud Computing, Benefits, Cloud Service Models, Deployment Models, Cloud Computing Infrastructure, Cloud Challenges, Cloud Adoption Consideration, Concepts in practice.

UNIT-V

Storage Security & Management: Security threats, and countermeasures in various domains, Security solutions for FC-SAN, IP-SAN and NAS environments, Security in virtualized and cloud environments, Monitoring and managing various information infrastructure components in classic and virtual environments, information lifecycle management(ILM) and storage tiering.

Case Study:

1. Technologies described in the course are reinforced with BROCADE & EMC examples of actual solutions.
2. Realistic case studies enable the participants to design the most appropriate solution for given sets of criteria.

Text Books:

1. EMC Corporation, "Information Storage and Management", Second Edition, Wiley Publishers.
2. John W. Rittinghouse, "Implementation Management and Security", James F. Ransome, CRC Press.

Suggested Reading:

1. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003.
2. Marc Farley, "Building Storage Networks", Tata McGraw Hill, Osborne, 2001.
3. Meeta Gupta, "Storage Area Network Fundamentals", Rearson Education Limited, 2002.

CS 352

IMAGE PROCESSING
(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To gain the fundamentals of digital image processing.
2. To provide mathematical foundations for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression.
3. To be able to formulate solutions to general image processing problems,

Course Outcomes:

1. Student will learn the mathematics behind the image processing
2. Student will be able to understands the significance of image processing and will be able to solve the problems in image processing

UNIT-I

Introduction to Digital Image Processing: Origins and Applications of Digital Image Processing. Fundamental Steps in Digital Image Processing, Components of Digital Image Processing System. Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization.

UNIT-II

Filtering in the Frequency Domain: Preliminary Concepts, Sampling and the Fourier Transform of Sampled Functions, The Discrete Fourier Transform (DFT) of One Variable, Extension to Function of Two Variables, Image Smoothing and Sharpening using Frequency Domain Filters.

UNIT-III

Filtering Intensity Transformations and Spatial: Histogram Processing, Fundamental of Spatial Filtering, Smoothing and Sharpening Spatial Filters.

Image Segmentation: Point, Line and Edge Detection, Thresholding-(Foundation, Basic global thresholding, Otsus method), Region-Based Segmentation.

UNIT-IV

Image Compression: Fidelity Criteria, Image Compression Models, Image Formats, Containers and Compression Standards.

Compression Methods: Huffman Coding, Golomb Coding, Arithmetic Coding, LZW Coding, Run-Length Coding.

UNIT-V

Restoration: Noise Models, Inverse filtering. Least squares Filtering.

Color Image Processing: Color fundamentals, Color models, Pseudocolor Image Processing, Basics of full color image processing.

Text Books:

1. Gonzalez R.C., Woods R.E**:** Digital Image Processing, Pearson Education, third edition 2012.
2. William K. Pratt," Digital Image Processing",John Wiley & Sons Inc.Edition,2001.

Suggested Reading:

1. McAndrew, Introduction to Digital Image Processing, Cengage Learning 2004.
2. Sonka, Hlavac, Boyle, Digital Image Processingand Computer vision, Cengage learning, 2008.
3. Rosenfeld A. Kak AC: Digital Picture Processing Vol.I & II Acad,Press,2nd Edition , 1982.

CS 353

ADVANCED COMPUTER ARCHITECTURE

(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course objectives:

1. To describe computational models and learn the fundamental aspects of computer architecture design
2. Understand advanced issues in design of computer processors, caches, and memory.
3. Analyze performance trade-offs in computer design.
4. Understand pipelining, instruction set architectures and Multi-Threaded Architectures
5. To acquaint the student with various classes of computers, and new trends and developments in computer architecture

Course Outcomes:

1. Understand the advanced concepts of computer architecture
2. Apply knowledge of processor design to improve performance in algorithms and software systems.
3. Investigate modern design structures of Pipelined Processors and Multiprocessor Systems
4. Become acquainted with recent computer architectures and I/O devices
5. Gain knowledge of Semiconductor technology, Interconnection technology, Optical computing, Bio-electronic computing and future directions.

UNIT-I

Computational models: The concept of a computational model, Basic computational models, The von Neumann computational model, Key concepts relating to computational models.

The concept of Computer Architecture: Evaluation and interpretation, Interpretation of the concept of computer architectures at different levels of abstraction, as a multilevel hierarchical framework, Extensions and description of computer architectures.

Introduction to Parallel Processing: Basic concepts, Types and levels of parallelism, classification of parallel architectures, basic parallel techniques, Relationships between languages and parallel architectures.

Introduction to ILP-Processors: Evaluation and overview of ILP-Processors, Dependencies between instructions, Instruction scheduling, preserving sequential consistency, the speed-up potential of ILP-Processing.

Pipelined Processors: Basic concepts ,Design space of pipelines, Overview of pipelined instruction processing, Pipelined execution of integer and Boolean instructions, Pipelined processing of loads and stores.

UNIT-II

VLIW Architectures: Basic Principles, Overview of proposed and commercial VLIW architectures, Case study: The Trace 200 family.

Superscalar Processors: Processing of Control Transfer Instructions introduction, Basic approaches to branch handling, Delayed branching, Branch processing, Multiway branching, Guarded execution.

Code Scheduling for ILP-Processors: Introduction, Basic block scheduling, Loop scheduling,Global scheduling.

UNIT-III

Introduction to Data-Parallel Architectures: Introduction, connectivity, Alternative architectural classes.

SIMD Architectures : Introduction, design space, Fine-grained SIMD architectures, Coarse-grained SIMD architectures.

Associative and Neural Architectures: Introduction, Associative Processing-An example: the associative string processor, Application array mapping, Neural computers.

UNIT-IV

Data: Parallel Pipelined and Systolic Architectures: Introduction, Pipelines, Systolic architectures.

Vector Architectures: Introduction, word length, vectorization, pipelining, parallel computing streams, technology-the Cray family, The Convex C4/XA system.

Introduction to MIMD Architectures: Architectural concepts,Problems of scalable computers,Main design issues of scalable MIMD computers.

UNIT-V

Multi-threaded Architectures: Introduction, computational models, von Neumann-based multi threaded architectures, dataflow architectures, Hybrid multi-threaded architectures, distributed Memory MIMD Architectures: Introduction, direct interconnection networks, Fine-grain systems, Medium-grain systems, Coarse-grain multi-computers.

Shared Memory MIMD Architectures: Introduction, Dynamic interconnection networks, Cache coherence, Synchronization and event ordering in multi-processors, UMA, NUMA, CC_NUMA, COMA machines.

Outlook: Introduction, Semiconductor technology, Interconnection technology, Optical computing, Bio-electronic computing, future directions.

Text Books:

1. Sima, Fountain, Kacsuk, "Advanced Computer Architectures: A design space approach", Pearson Education,2004.
2. Richard Y.Kain, "Advanced Computer Architectures: A Systems design approach",Prentice Hall India,2005.
3. David E.Culler, Jaswinder Pal Singh and Anoop Gupta, "Parallel computer Architecture:A hardware software approach", Morgan kaufmann publishers, 2009.

Suggested Reading:

1. Kai Hwang, "Advanced Computer Architecture", Mc Graw Hill, 1999.
2. John L.Hennessy & David A Patterson,"Computer Architectures A Quantitative Approach", Morgan Kaufmann Publishers, Inc, 1996.

CS 354

SIMULATION AND MODELING

(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Introduce computer simulation technologies and techniques, provides the foundations for the student to understand computer simulation needs, and to implement and test a variety of simulation and data analysis libraries and programs. This course focuses what is needed to build simulation software environments, and not just building simulations using preexisting packages.
2. The goal is to introduce students to basic simulation methods and tools for modeling and simulation of continuous, discrete and combined systems.
3. Introduce concepts of modeling layers of society's critical infrastructure networks.
4. Build tools to view and control simulations and their results.

Course Outcomes:

Students will be exposed to the details of modeling and simulation technologies. They will cover the following:

1. Basic Model Forms,Simulation Approaches
2. Handling Stepped and Event-based Time in Simulations
3. Discrete versus Continuous Modeling
4. Numerical Techniques
5. Sources and Propagation of Error
6. By the end of the course students will be able to apply the fundamental laws of performance analysis to establish the relationships between workload parameters and system performance for a given system.

UNIT-I

Introduction to Simulation: Advantages and Disadvantages of simulation, Areas of application, System and System Environment, Components of a System, Discrete And Continuous Systems, Model of a System ,Types of Models ,Discrete-Event System Simulation, Steps in a Simulation Study, Simulation Examples.

UNIT-II

Overview of Statistical models and queuing systems: Programming languages for simulation, Continuous and discrete simulation languages-FOTTRAN, GPSS, SIMAN, SIMSCRIPT, SLAM and MODSIM III

UNIT-III

Random Numbers: generation, properties of random numbers, generation of pseudo-random numbers, tests for random numbers, Random variate: generation, inverse transformation technique, uniform distribution, exponential distribution. Weibul's distribution, triangular

distributions, direct transformation for the normal distribution, convolution method of Erlang distribution, Acceptance rejection techniques: Poisson distribution, Gamma distribution.

UNIT-IV

Input data analysis: Data Collection, Identify the distribution, parameter and estimation. Goodness of fit tests: Chi square test- KS test, Multivariate and time series input models, Verification and validations of simulation models, Model building, **verification and validation:** Verification of simulation models, calibration and validation of models face validity, Validation of model assumptions, validation input/output Transformations, Input/output validation using historical input data, Input/output validation using Turning test.

UNIT-V

Output data analysis, stochastic nature of output data, Types of simulation with respect to output analysis. Measures of performance and their estimation, Output analysis for terminating simulations, Output analysis for steady-state simulations, Comparision and evaluation of alternative system designs: Comparison of several system designs. Statistical models for estimating the effect of design alternatives.

Text Books:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, and David M. Nicol. Discrete-Event System Simulation, Pearson Education Asia, 2001.
2. Narsingh Deo, System Simulation with Digital Computers, Prentice Hall of India, 1979.

Suggesting Reading:

1. Anerill M Law and W. David Kelton, Simulation Modeling and Analysis, McGraw Hill, 2009.

CS 355

REAL TIME SYSTEMS

(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. Define Real Time systems and differentiate between hard and soft realtime systems
2. Study applications of realtime systems
3. Get a theoretical understanding of realtime aspects of computing in terms of scheduling, timing and concurrency
4. Know specific design and implementation aspects of realtime systems
5. Understand capabilities of RealTime operating systems like Vx Works and RT Linux

Course Outcomes:

1. Understand the fundamental concepts of real-time systems.
2. Gain theoretical and practical knowledge of real-time operating systems
3. Understand capabilities of commercial off-the-shelf R-T kernel

UNIT-I

Introduction: Definition, Applications and Types of Real Time Systems, Typical Case Studies of Real Time Systems, Timing Constraints.

A Reference Model for Real Time Systems: Processors and Resources, Periodic Task Model, Precedence and Data Dependency, Temporal, Functional and Resource parameters, Scheduling Hierarchy.

UNIT-II

Real Time Scheduling: Different Approaches – Clock Driven, Priority Driven, Scheduling of Periodic, Aperiodic and Sporadic Jobs in Priority Driven Systems.

UNIT-III

Resource Management: Resources and Resource Access Control, Critical Section, Priority: Ceiling Protocols, Concurrent Access to Data Objects.

UNIT-IV

Implementation Aspects: Timing Services and Scheduling Mechanisms, Other Basic Operating System Functions, Processor Reserves and Resource Kernel, Open System Architecture, Capabilities of Commercial Real Time Operating Systems, Predictability of General Purpose Operating Systems.

UNIT-V

Case Studies: Vx – Works, RT Linux.

Text Books:

1. Jane W.S. Liu, “Real Time System”, Pearson Education Asia, 2001.

Suggested Reading:

1. C.M. Krishna and Kang O. Shin, “Real Time Systems”, McGraw Hill Companies Inc., 1997.
2. Raymond J.A. Buhr, Donald L. Bailey, “An Introduction to Real Time Systems”, Prentice Hall International, 1999.
3. K.V.K.K. Prasad, “Embedded Real Time Systems, Concepts, Design and Programming”, Dream Tech., 2003.

CS 356

SOFT COMPUTING

(Elective – I)

Instruction	4L Periods per week
Duration of University Examination	3 Hours
University Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To learn various types of soft computing techniques and their applications.
2. To acquire the knowledge of neural network architectures, learning methods and algorithms.
3. To understand Fuzzy logic ,Genetic algorithms and their applications.

Course Outcomes:

1. Ability to apply soft computing techniques to solve different applications.
2. Design and develop various Neural Network Architectures.
3. Ability to use fuzzy logic, genetic algorithms in different applications.

UNIT-I

Soft computing vs. Hard computing, Various types of soft computing techniques.
Artificial Neural Networks: Fundamental concepts, Evolution of neural networks, Basic models of artificial neural network, Important terminologies of ANNs. McCulloch-Pitts neuron, Linear separability, Hebb network.

UNIT-II

Supervised Learning Neural Networks: Perceptron networks, Adaptive linear neuron(Adaline), Multiple Adaptive linear neuron(Madaline), Back propagation network

UNIT-III

Unsupervised Learning Neural Networks: Kohonen self organizing networks, Adaptive resonance theory.
Associate Memory Networks: Bidirectional associative memory network, Hopfield networks.

UNIT-IV

Fuzzy Logic: Introduction to classical sets and Fuzzy sets, Fuzzy relations, Tolerance and equivalence relations, Membership functions, Defuzzification,

UNIT-V

Genetic Algorithms: Introduction, Basic operators and terminology, Traditional algorithm vs. genetic algorithm, Simple genetic algorithm, General genetic algorithm, Classification of genetic algorithm, Genetic programming, Applications of genetic algorithm.

Text Books:

1. S.N. Sivanandam& S.N. Deepa, ”Principles of soft computing”, Wiley publications, 2nd Edition, 2008.

Suggested Readings:

1. S. Rajasekaran& G.A. Vijayalakshmipai, "Neural Networks, Fuzzy logic & Genetic Algorithms, Synthesis & Applications", PHI publication, 2008.
2. LiMin Fu, “Neural Networks in Computer Intelligence”,McGraw-Hill edition, 1994.
3. K.L.Du& M.N.S Swamy, "Neural Networks in a Soft Computing Framework", Springer International edition, 2008.
4. Simon Haykins, "Neural Networks a Comprehensive Foundation", PHI, second edition.
5. Goldberg, David E., "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, New Delhi, 2002.

CS 326

WEB TECHNOLOGIES LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessionals	25 Marks
Credits	2

Course Objectives:

1. To acquire knowledge of XHTML, Java Script and XML to develop web applications
2. Ability to develop dynamic web content using Java Servlets and JSP
3. To understand JDBC connections and Java Mail API
4. To understand the design and development process of a complete web application

Course Outcomes:

1. Students will be able to develop static web sites using XHTML and Java Scripts
2. To implement XML and XSLT for web applications
3. Develop Dynamic web content using Java Servlets and JSP
4. To develop JDBC connections and implement a complete Dynamic web application

List of experiments:

1. Creation of static web site using XHTML and CSS.
2. Demonstration of XML, XSLT.
3. Validation of static web page using Java script.
4. Creation of dynamic content in web application using servlets.
5. Handling Sessions in web applications.
6. Usage of Filters in web applications.
7. Creation of dynamic content in web application using JSP
8. Providing data store support for web site using JDBC
9. Implementation of JAVA MAIL
10. CASE STUDY:

    Creation of dynamic web site using all the above topics.

Text Books :

1. SubramanyamAllamraju, “Professional Java Server programming”, J2EE 1.3 Edition, CeditBuest, Apress Publications.
2. Robert W Sebesta, “Programming the World Wide Web”, Pearson Education

CS 327

COMPILER CONSTRUCTION LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objective:

1. To implement Lexical Analyzer using Lex tool & Syntax Analyzer or parser using YACC Tool
2. To implement NFA and DFA from a given regular expression
3. To implement front end of the compiler by means of generating Intermediate codes.
4. To implement code optimization techniques.

Course Outcomes:

1. Design & implement a front end of the compiler.
2. Develop program for solving parser problems.
3. Create program for intermediate code generation and optimization of the IC.
4. Learn & use the new tools and technologies used for designing a compiler.

List of experiments:

1 Program to implement Standalone Scanner
2 Implement Scanner using LEX tool.
3 Implementing TOPDOWN PARSERS RDP
4 Implement First Method
5 Implement Follow Method
6 Program to implement LL(1) parsing technique.
7 BOTTOM UP PARSERS:Program to implement Parser using Yacc.
8 Implementing basic calculator using YACC
9 Implement Closure
10 Implement Goto
11 Intermediate code generation
12 Program to perform Code Optimization.

Text Books:

1. Keith D Cooper & Linda Tarezon, "Engineering a Compiler", MorganKafman, Second edition.Lex&Yacc, John R Levine, Tony Mason, Doug Brown, ShroffPublishers.

Suggested Reading:

2. Kenneth C Louden, "Compiler Construction: Principles andPractice", Cengage Learning. Lex&Yacc, John R Levine, Oreilly Publishers.

CS 328

COMPUTER NETWORKS LAB

Instruction	3 Periods per week
Duration of University Examination	3 Hours
University Examination	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. To understand various network concepts
2. Protocols and develop network related applications using those protocols. Also simulate various network protocols like ARP, Sliding Window Flow control, FTP etc. and evaluate some protocols.
3. To understanding the public key concepts

Course Outcomes:

After completion of this course, student will be able to

1. Understand about the network programming concepts
2. Develop network-oriented applications and simulate network protocols
3. Evaluate network performance
4. Implement security algorithms

Computer Networks Lab:

1. Programs using TCP sockets
2. Programs using UDP
3. Programs using Raw Sockets like packet capturing and filtering)
4. Programs using RPC
5. Simulation of Sliding Window Protocol
6. Implementation of ARP
7. Implementation and performance evaluation of routing Protocols
8. Study of UDP performance
9. Study of TCP performance
10. Implementation of RSA
11. Simulation of FTP
12. Simulation of ping

Suggested Readings:

1. UNIX Network Programming, Volume 1, W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Addison Wesley Professional, 2004
2. W. Richard Stevens, Stephen A. Rago "Advanced Programming in the UNIX Environment", Addition Wesley, 2013

CS 329

INDUSTRIAL VISIT/SUMMER INTERNSHIP

14 Periods / Semester

Students are expected to visit at least two industries during the semester and submit a detailed technical report about the industrial visit/study. The department should evaluate the reports through a committee.

WITH EFFECT FROM ACADEMIC YEAR 2016-17

Syllabus of B.E. IV YEAR
OF

FOUR YEAR DEGREE COURSE
IN

COMPUTER SCIENCE AND ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)
Hyderabad – 500 075

WITH EFFECT FROM ACADEMIC YEAR 2016-17

Chaitanya Bharathi Institute of Technology (Autonomous)

SCHEME OF INSTRUCTION & EXAMINATION
B.E - IV Year

COMPUTER SCIENCE & ENGINEERING

SEMESTER-I

Sl.No	Syllabus Ref. No	SUBJECT	Scheme of Instructions		Scheme of Examination			Credits
			Per Week		Duration in Hrs.	Maximum Marks		
			L/T	D/P		Uni. Exam	Sessional	
THEORY								
1	CS 411	Artificial Intelligence	4	-	3	75	25	3
2	CS 412	Distributed Computing	4	-	3	75	25	3
3	CS 413	Data Mining	4	-	3	75	25	3
4	CS 414	OOSD	4	-	3	75	25	3
5		Elective - II	4	-	3	75	25	3
PRACTICALS								
6	CS 415	Data Mining Lab	-	3	3	50	25	2
7	CS 416	OOSD Lab	-	3	3	50	25	2
8	CS417	Project Seminar	-	3	3	-	25	1
		TOTAL	**20**	**09**	**24**	**475**	**200**	**20**

Elective-II:

CS 461 Mobile Computing
CS 462 Adhoc Sensor Networks
CS 463 Optimization Techniques
CS 464 Open Source Technologies
CS 465 Software Project Management
ME 464 Entrepreneurship

WITH EFFECT FROM ACADEMIC YEAR 2016-17

Chaitanya Bharathi Institute of Technology (AUTONOMOUS)

SCHEME OF INSTRUCTION & EXAMINATION

B.E - IV Year
COMPUTER SCIENCE & ENGINEERING

SEMESTER-II

	Syllabus Ref. No	SUBJECT	Scheme of Instructions per Week		Scheme of Examination			Credits
					Duration in Hrs.	Maximum Marks		
			L/T	D/P		Uni. Exam	Sessionals	
THEORY								
1	CS 421	Information and Network Security	4	-	3	75	25	3
2		Elective-III	4	-	3	75	25	3
3		Elective-IV	4	-	3	75	25	3
PRACTICALS								
4	CS 422	Information and Network Security Lab	-	3	3	50	25	2
5	CS 423	Seminar	-	3	-	-	25	1
6	CS 424	Project	-	6	Viva Voce	100	50	9
		TOTAL	**12**	**12**	**12**	**275**	**175**	**21**

Elective-III:

CS 471 Data science and big data analytics
CS 472 Cloud Computing
CS 473 Semantic Web & Social Networks
CS 474 Cyber Forensics
CS 475 Human Machine Interaction
CS 476 Software Reuse Techniques

Elective-IV:

CS 481 Pattern Recognition
CS 482 Bio Informatics
CS 483 Machine Learning
CS 484 Business Intelligence
ME472 Intellectual Property Rights
CE 422 Disaster Mitigation and Management

SEMESTER-I

WITH EFFECT FROM ACADEMIC YEAR 2016-17

CS 411

ARTIFICIAL INTELLIGENCE

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To list the significance of AI.
2. To discuss the various components that are involved in solving an AI problem.
3. To analyze the various knowledge representation schemes, Reasoning and Learning techniques of AI.
4. Apply the AI concepts to build an expert system to solve the real world problems.

Course Outcomes:

After completion of the course, student should be able to:

1. Differentiate between a rudimentary Problem and an AI problem, it's Characteristics and problem solving Techniques.
2. Determine and evaluate the various search strategies.
3. Compare and contrast the various "knowledge representation" schemes of AI.
4. Understand and Analyze the various reasoning techniques involved in solving AI problems.
5. Understand the different learning techniques.
6. Apply the AI techniques to solve the real world problems.

UNIT I

Introduction & Problem Solving: AI problems, AI Technique, Defining problem as a State-Space Search, Production Systems, Problem Characteristics, Production System Characteristics.
Heuristic Search Techniques: Generate – and – test, Hill Climbing, Best – First Search, Problem Reduction, Constraint Satisfaction, Means-ends Analysis.

UNIT II

Game Playing: Overview, Min-Max search Procedure, Adding Alpha-beta Cutoffs, Additional Refinements, Iterative Deepening.
Knowledge Representation Issues: Approaches, Issues, Frame Problem,
Using Predicate Logic: Representing simple facts in logic, Representing Instance and ISA Relationships, Computable Functions and predicates, Resolution, Natural Deduction.

UNIT III

Uncertainty and Reasoning Techniques: Non monotonic reasoning, Logics for Non monotonic reasoning, Implementation issues, Augmenting a problem solver, implementation of Depth First Search and Breadth first search.

Statistical reasoning: Probability and Bayes theorem, Certainty factors and Rule-based systems, Bayesian Networks, Dempster-Shafer Theory.

UNIT IV

Learning: What is Learning, Rote learning, Learning by taking advice, Learning in problem solving, learning from examples: Induction, Learning by Decision trees.

Expert System: Representing and Using Domain Knowledge, Expert systems shells, Explanation, Knowledge Acquisition.

UNIT V

Perception and Action: Real Time Search, Vision, Speech Recognition, ACTION: Navigation, Manipulation, Robot architectures.

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Statistical NLP, Spell Checking.

TEXT BOOKS:

1. Elaine Rich, Kevin Night, Shivashankar B Nair, "Artificial Intelligence",3rd Edition.,2008
2. Russell Norvig, "Artificial Intelligence-Modern Approach", 3rd edition, 2009.

SUGGESTED READINGS:

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning India, 2012.
2. Nelson M. Mattos , "An Approach to Knowledge Base Management", Springer Berlin Heidelberg, 1991.

WITH EFFECT FROM ACADEMIC YEAR 2016-17

CS 412

DISTRIBUTED COMPUTING

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Present the principles underlying the function of distributed computing.
2. Create an awareness of distributed computing design and implementation.
3. Describe and distinguish synchronization and concurrency control in distributed computing system.
4. Understanding distributed transaction and control of distributed deadlocks.
5. Understanding distributed computing in cloud and grid computing.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the characteristics and models in distributed computing.
2. Understand key mechanisms of remote execution.
3. Get familiar with synchronization of processes in distributed environment.
4. Acquire the knowledge of distributed transaction, concurrency and deadlock.
5. Acquire the knowledge of working of grid and cloud computing.
6. Identify the problems in developing distributed applications.

UNIT I

Characterization of Distributed Systems: Introduction, Examples of distributed systems, Resource sharing and the web, Challenges.
System Models: Introduction, Architectural models, Fundamental models.
Operating System Support: Introduction, The operating system layer, Protection, Processes and threads, Communication and invocation, Operating system architecture.

UNIT II

Interprocess communication: Introduction, The API for the internet protocols, External data representation and marshalling, Client Server communication, Group Communication.
Case study: Interprocess communication: Introduction to UNIX.
Distributed objects and Remote Invocation: Introduction, Communication between distributed objects.
Remote procedure call, Events and notifications.
Case study: Java RMI.
Name Services: Introduction, Name services and the Domain Name System.

UNIT III

Time and Global States: Introduction, Clocks events and process states, Synchronizing physical clocks, Logical clocks, Global states, Distributed debugging.

Coordination and Agreement: distributed mutual exclusion, Election, Multicast communication, Consensus and related problems.

UNIT IV

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

Distributed Transactions: Introduction, Flat and nested distributed transactions, Atomic commit process, Concurrency control in distributed transactions.

Distributed deadlocks, Transaction recovery.

Replication: Introduction, System model and group communication, Fault-tolerant services.

UNIT V

Grid Computing: How Grid Computing Works, Grid Middleware, Grid Architecture, Types of Grids, Grid Computing Applications.

Service Oriented Architecture, Web Services , Service-Oriented Grid, SOA Design and Development, Advantages and the Future of SOA.

Cloud Computing: Features and Architecture, Cloud Computing Landscape.

TEXT BOOKS:

1. Colouris, Dollimore, Kindberg, " Distributed Systems concepts and Design", 5th Ed. Pearson Education, 2016.
2. Andrew S. Tanenbaum, Van Steen, " Distributed Systems" , Pearson Education , 2002.

SUGGESTED READINGS:

1. Sunita Mahajan and Seema Shah ,"Distributed Computing", Oxford University Press, 2013.
2. S.Ghosh, Chapman and Hall/CRC ,"Distributed Systems" , Taylor & Francis Group, 2010.
3. Pradeep K.Sinha ,"Distributed Operating Systems Concepts and Design" , PHI.

CS 413

DATA MINING

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Understand data mining principles and techniques: Introduce DM as a cutting edge business intelligence method and acquaint the students with the DM techniques for building competitive advantage through proactive analysis, predictive modeling, and identifying new trends and behaviors.
2. Building basic terminology.
3. Learn how to gather and analyze large sets of data to gain useful business understanding.
4. Learn how to produce a quantitative analysis report/memo with the necessary information to make decisions.
5. Describing and demonstrating basic data mining algorithms, methods, and tools
6. Identifying business applications of data mining
7. Develop and apply critical thinking, problem-solving, and decision-making skills.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand operational database, warehousing and multidimensional need of data base to meet industrial needs.
2. Apply the association rules for mining the data.
3. Design and deploy appropriate classification techniques.
4. Cluster the high dimensional data for better organization of the data.
5. Compare and contrast the dominant data mining algorithms.
6. Introduce knowledge gain about data mining, decision tree, neural networks and clustering.

UNIT I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT II

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Usage of Data Warehousing Online Analytical Processing and Mining Data Cube Computation: Efficient Methods for simple Data Cube Computation (Full Cube, Iceberg Cube, Closed Cube and Shell

Cube), Discovery Driven exploration of data cubes, Attribute-Oriented Induction for data characterization and its implementation.

UNIT III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, The Apriori algorithm for finding frequent itemsets using candidate generation, Generating association rules from frequent itemsets, Mining frequent itemsets without candidate generation, Mining various kinds of Association Rules, Correlation Analysis.

UNIT IV

Classification and Prediction: Description and comparison of classification and prediction, preparing data for Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation Prediction, linear and non-linear regression, evaluating accuracy of a Classifier or a Predictor.

UNIT V

Cluster Analysis: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, k-means and k-mediod methods, CLARANS, Agglomerative and divisive hierarchical clustering, chameleon dynamic modeling, Constraint-Based Cluster Analysis, Outlier Analysis.

TEXT BOOKS:

1. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining – Concepts and Techniques" , 3rd edition, Morgan Kaufmann Publishers, ELSEVIER,2012.
2. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2005.

SUGGESTED READINGS:

1. Sam Aanhory & Dennis Murray "Data Warehousing in the Real World" , Pearson Edn Asia.
2. K.P.Soman, S.Diwakar, V.Ajay ,"Insight into Data Mining", PHI, 2008.
3. Ralph Kimball Wiley "The Data Warehouse Life cycle Tool kit",student edition
4. William H Inmon, John Wiley & Sons Inc "Building the Data Warehouse", 2005.
5. Margaret H Dunham "Data Mining Introductory and advanced topics", Pearson education.
6. Arun K Pujari "Data Mining Techniques", 2nd edition, Universities Press.

CS 414

OBJECT ORIENTED SYSTEM DEVELOPMENT(OOSD)

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Understanding object basics, classes and objectives, inheritance.
2. How software objects are altered to build software systems that are more robust.
3. To understand and to gain the level of competence in the area of OOSD.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the importance of modeling.
2. Understand the basic, advanced structural modeling and basic behavioral modeling.
3. Understand the advanced behavioral modeling.
4. Understand the architectural modeling.
5. Get familiar with the Unified Software Development Approach.
6. Get familiar with the concepts and various diagrams using UML.

UNIT I

UML Introduction: Necessity of a model, Introducing the UML, Hello World.
Basic Structural Modeling: Classes, Relationships, Common Mechanisms, Diagrams, Class diagrams.

UNIT II

Advanced Structural Modeling: Advanced Classes, Advanced Relationships, Interfaces, Types and Roles, Packages, Instances, Object diagrams.
Behavioral Modeling: Use Cases, Use case diagrams, Interactions, Interaction diagrams, Activity diagrams.

UNIT III

Advanced Behavioral Modeling: Events and Signals, State machines, Processes and Threads, State Chart diagrams.

UNIT IV

Architectural Modeling: Components, Component diagrams, Deployment, Deployment diagrams, Patterns and Frameworks.

UNIT V

Unified Software Development Process: The Unified Process, The Four Ps, A Use-Case Driven Process, An Architecture-Centric Process, An Iterative and Incremental Process.

TEXT BOOKS:

1. Grady Booch, James Rumbaugh, Ivar Jacobson : The Unified Modeling Language User Guide, Pearson Education, 2007.
2. Ivar Jacobson, Grady Booch, James Rumbaugh, "The Unified Software Development Process", Rational Software Corporation,2014.

SUGGESTED READINGS:

1. Simon Bennet, Steve Mc. Robb, Ray Farmer, “Object Oriented System Analysis and Design using UML”, McGraw Hill, 2002.
2. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
3. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
4. Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger, Robert B Jackson and Stephen D Burd, Cengage Learning.
5. Ali Bahrami, “Object Oriented System Development”, Tata McGraw Hill, 2015.

CS 415

DATA MINING LAB

Instruction	3L per week
Duration of SEE	3 Hours
SEE	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. Understand basic data mining principles, to apply data mining algorithms to huge data.
2. To provide a practical exposure on data warehouse operations and schemas.
3. To be able to understand the requirements of information and knowledge gain.

Course Outcomes:

After completion of the course, student should be able to:

1. Describe the usage of data mining tools
2. Analyze the data using data mining algorithms.
3. Master on the data warehouse methods and schemas.
4. Master on the gain the knowledge using the data mining from large data.

List of programs:

1. Implement the following Multidimensional Data Models

i. Star Schema

ii. Snowflake Schema

iii. Fact Constellation

2. Implement Apriori algorithm to generate frequent Item Sets
3. Implement the following clustering algorithms

i. K-means

ii. K-mediods

4. Implement the following classification algorithms

i. Decision Tree Induction

ii.KNN

5. Perform Data Preprocessing using WEKA
6. Perform Discretization of data using WEKA
7. Classification algorithms using WEKA

8. Apriori algorithm using WEKA.

9. Perform data transformations using an ETL Tool.

10. A small case study involving all stages of KDD. (Datasets are available online like UCI Repository etc.).

11. Introduction to Informatica Tool for ETL operations.

TEXT BOOK:

1. Roiger, Richard, "Data Mining : A Tutorial Based Primer".

SUGGESTED READINGS:

1. K.P.Somen, Shyam Diwakar and V.Aja,"Insight into Data Mining theory and practice", Eastern Economy Edition, Prentice Hall of India, 2006.

CS 416

OOSD LAB

Instruction	3L per week
Duration of SEE	3 Hours
SEE	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. Develop a problem statement.
2. Develop an standard SRS document.
3. Design various UML diagrams.

Course Outcomes:

After completion of the course, student should be able to:

1. Identity the conceptual classes and develop a domain model with UML Class diagram.
2. Identify Use Cases and develop the Use Case model.
3. Usethe identified scenarios find the interaction between objects and represent those using UML Interaction diagrams.
4. Identify the business activities and develop an UML Activity diagram.
5. Draw the State Chart diagram.
6. Draw Component and Deployment diagrams.

List of Programs:

Select one Information System/Approach and device the following using UML tool:

1. Structured Diagrams (Data Flow Diagrams, Entity-Relationship Diagrams etc..)
2. Preparation of Software Requirement Specification Document for a given Case Study.

UML Diagrams

1. Use Case Diagrams
2. Class Diagrams
3. Object Diagrams
4. Sequence Diagrams
5. Collaboration Diagrams
6. Activity Diagrams
7. State Chart Diagrams
8. Component Diagrams
9. Deployment Diagrams

TEXT BOOKS:

1. Simon Bennet, Steve Mc. Robb, Ray Farmer, "Object Oriented System Analysis and Design using UML", McGraw Hill, 2002.
2. Pascal Roques: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.

CS 417

PROJECT SEMINAR

Instruction	3L per week
Sessionals	25 Marks
Credits	1

Dealing with a real time problem should be the focus of under graduate project.

Faculty members should prepare project briefs (giving scope and references) well in advance, which should be made available to the students in the department.
The project may be classified as hardware / software modeling / simulation. It may comprise any or all elements such as analysis, design and synthesis.

The department should appoint a project coordinator who will coordinate the following.

- Grouping of students (a maximum of 3 in group)
- Allotment of projects and project guides
- Project monitoring at regular intervals.

All project allotment are to be completed by the 3rd week of IV–Year, I-Semester, so that the students get sufficient time for completion of the project by the end of II-semester.

Efforts be made the some of the projects are carried out in reputed industries / research organizations with the help of industry coordinators. Problems can also be invited from the industries to be worked out through undergraduate projects.

Oral presentation is an important aspect of engineering education. The students have to deliver a seminar on the 'project' they have chosen or allotted by the department, on the advice and approval from the faculty members. Students are exposed to the following aspects for seminar presentation.

- Literature Survey
- Organization of the material
- Power point presentation
- Technical writing

Each student project batch is required to:

1. Submit a one-page synopsis before the seminar talk for display on the notice board.
2. Give a 20-30 minutes presentation through power point presentation.
3. Submit a report on the project with list of references and slides used.

Project Seminars are to be scheduled from the 4th week of the I-semester to the last week of the I-semester.

For award of Sessional marks students are judged by the project coordinator and guide on the basis of an oral and written presentation as well as their involvement in the discussions.

Elective II:

WITH EFFECT FROM THE ACADEMIC YEAR 2016 - 2017

CS 461

MOBILE COMPUTING

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Understand and identify the GSM, GPRS and Bluetooth software model for mobile computing.
2. Understand, analyze and explain problems associated to localization and movements, the wireless and wired communication architecture, handling of data and business application over slow wireless networks.
3. Understand and identify business data management and security issues over slow wireless media.
4. Understand, analyze and explain working of software mobile agents over long distances, transaction processing over wire and wireless media.
5. Introduce with ad-hoc networks, clustering and their usage in practical world.
6. Understand various routing and communication protocols and QoS over wire and wireless channels.
7. Understand and recognize CDMA and other network applications.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand working, characteristics and limitations of mobile hardware devices including their user-interface modalities.
2. Understand and learn frequency band, spectrum, air interface and channel structure.
3. Understand the necessary knowledge of cellular communication, infrastructure-less networks.
4. Analyze TCP, MAC protocols and their technical feasibility.
5. Work as a part of team on multidisciplinary and device independent application projects.
6. Understand and implement the hardware components/architectures/databases/operating system of mobile networks that is necessary to built self confidence to develop novel products and solutions for real world.

UNIT I

Introduction: History of wireless communication, Applications, Wireless transmission. Frequencies for radio transmission, Regulations, Signals, Antennas, Signal propagation, Multiplexing, Spread spectrum, Cellular Systems.

UNIT II

Medium access control : motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA . Telecommunication Systems : GSM, GPRS, DECT.

Satellite Networks – Applications, Basics, Routing, Localization, Handover, Examples.

UNIT III

Broadcast Systems: DAB , DVB.

Wireless LAN :IEEE 802.11 , Architecture ,services ,MAC ,Physical layer.
IEEE 802.11 a , 802.11 b standards ,HIPERLAN , Bluetooth.

UNIT IV

Mobile IP, Dynamic Host Configuration Protocol, Routing in MANETs – Routing, DSDV, DSR, Alternative metrics, Overview ad-hoc routing protocols.

UNIT V

Traditional TCP – Classical TCP improvements – WAP, and WAP 2.0., File Systems and Mobility Management, Windows CE, Palm OS, Symbian OS.

TEXT BOOKS:

1. Jochen H. Schiller, "Mobile Communications", Addison Wesley, Second Edition, 2003.
2. William Stallings, "Wireless Communications and Networks", PHI/Pearson Education, 2002.

SUGGESTED READINGS:

1. Asoke K Talukder, et al, "Mobile Computing", Tata McGraw Hill, 2008.
2. Raj Kamal, "Mobile Computing", Oxford University press.

CS 462

ADHOC SENSOR NETWORKS

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To impart knowledge of adhoc networks, design and implementation issues, and available solutions.
2. To impart knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid.
3. To provide knowledge of sensor networks and their characteristics.
4. Study the Applications of Sensor Networks.

Course Outcomes:

After completion of the course, student should be able to:

1. Describe the unique issues in ad-hoc/sensor networks.
2. Understand current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks.
3. Explain the challenges in designing MAC, routing and transport protocols for wireless ad-hoc sensor networks.
4. Gain knowledge on implementation of protocols on a sensor test bed network.
5. Explain the principles of mobile ad hoc networks (MANETs)
6. Explain the principles and characteristics of wireless sensor networks (WSNs).

UNIT I

Introduction to Ad-Hoc networks, Wireless LANs, Wireless PANs, Wireless Mesh Networks, Topology Control in Wireless Ad Hoc Networks, Broadcasting and Activity Scheduling in Ad Hoc Networks, Location Discovery, Mobile Ad Hoc Networks (MANETs): Routing Technology for Dynamic Wireless Networking, Congestion Control in ad hoc wireless networks.

UNIT II

Introduction, Routing in Ad Hoc Networks, Broadcasting, Multicasting and Geocasting, Mobile Ad-Hoc Networking with a View of 4G Wireless: Imperatives and Challenges, Off-the-Shelf Enables of Ad Hoc Networks, IEEE 802.11 in Ad Hoc Networks: Protocols, Performance and Open Issues.

UNIT III

Media Access Control (MAC) Protocols: Issues in designing MAC protocols, Classifications of MAC protocols, MAC protocols, Cognitive Radio and Networks, TCP over Ad Hoc Networks, Energy-Efficient Communication in Ad Hoc Wireless Networks, Ad Hoc Networks Security, Self-Organized and Cooperative Ad Hoc Networking, Security in Ad Hoc and Sensor Networks.

UNIT IV

Introduction to Sensor networks, Introduction and Overview of Wireless Sensor Networks: Applications of Wireless Sensor Networks, Examples of Category 1 WSN Applications, Basic Wireless Sensor Technology: Sensor Node Technology, Sensor Taxonomy, WSN Operating Environment, WSN Trends.

UNIT V

Sensor Networks Design Considerations, Sensor Networks in Controlled Environment, Wireless Transmission Technology and Systems: Radio Technology Primer, Available Wireless Technologies. Medium Access Control Protocols for Wireless Sensor Networks: Fundamentals of MAC Protocols, MAC Protocols for WSNs, Sensor-MAC Case Study, IEEE 802.15.4 LR-WPANs Standard Case Study.

Integrating MANETs, WLANs and Cellular Networks, Networking Sensors: Unique features, Deployment of ad-hoc/sensor network, Sensor tasking and control, Transport layer and security protocols, Applications of Sensor Networks.

TEXT BOOKS:

1. Carlos de Morais Cordeiro and Dharma Prakash Agrawal, "Ad Hoc and Sensor Networks : Theory and Applications", Second Edition, World Scientific Publishers, 2011
2. Prasant Mohapatra and Sriramamurty, "Ad Hoc Networks: Technologies and Protocols", Springer International Edition, 2009
3. Kazem Sohraby, Daniel Minoli, Taieb Znati, "Wireless Sensor Networks', A John Wiley & Sons Inc. Publication, 2007

SUGGESTED READINGS:

1. C. Siva Ram Murthy & B. S. Manoj, "Ad hoc Wireless, Networks – Architecture and Protocols", Prentice Hall, 2004.
2. Jagannathan Sarangapani, Wireless Ad hoc and Sensor Networks: Protocols, Performance, and Control, CRC Press, 2007.

CS 463

OPTIMIZATION TECHNIQUES

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems.
2. To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology
3. To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems**.**

Course Outcomes:

After completion of the course, student should be able to:

1. Get awareness about the real world problems, their understanding and ability to formulate mathematical models of these problems.
2. Understand the Transportation model, Traveling salesman and ability to find optimal solution.
3. Understand the major limitations and capabilities of deterministic operations research modeling as applied to problems in industry or government.
4. Learn to handle, solve and analyze problems using linear programming and other mathematical programming algorithms.
5. Learn how to deal with real world problems of Network analysis, Project Management, for their optimal solutions; for example, they understand how much optimum cable wire is required to give cable connection to some buildings connected by a network.
6. Learn different techniques to solve Non- Linear Programming Problems.

UNIT I

Operation Research – Introduction, Models, Areas of Application. Linear Programming (L.P.): Mathematical Formulation of L.P. problem. Graphical Method. Simplex Method – Concept of slack, surplus & artificial variables. Manual solutions of L.P.P. Minimization & Maximization Problems. Special Cases – (i) Alternative optima (ii) Unbounded solutions & (iii) Infeasible solutions to be shown graphically & also by simplex method.

UNIT II

Definition of the transportation model. Balanced / Unbalanced, Minimization / Maximization. Determination of the initial basic feasible solution using (i) North – West Corner Rule (ii) Least Cost method & (iii) Vogel's approximation method for balanced & unbalanced transportation problems. Optimality Test & Obtaining of optimal solution. (considering per unit transportation cost)

UNIT III

Assignment model. Assignment problem Formulation. Hungarian method for optimal solution. Solving unbalanced problem. Travelling Salesman problem and assignment problem.

Sequencing models, solution of sequence problem-processing n jobs through 2 Machines, processing n jobs through 3 machines, processing 2 jobs through m Machines, processing n jobs through m Machines.

UNIT IV

Integer Programming Problem: Introduction, Types of integer programming problems, Gomory's AII IPP Method, All IPP Algorithm, Branch and Bound Technique Game Theory: Introduction, Game with pure Strategies, Game with Mixed Strategies, Dominance property, Graphical method for 2Xn or mX2 Games, Linear programming Approach for Game Theory.

UNIT V

Construction of Network-Rules & Precautions C.P.M. & P.E.R.T. Networks. Obtaining of critical path, Time estimates for activities, Probability of completion of project. Determination of floats (total, free, independent &interfering).

TEXT BOOKS:

1. Kantiswarup,Gupta P.K.& Sultan Chand & Sons Manmohan, "Operations Research" 9th Edition, ,2013.
2. Taha H.A.,"Operations Research-An Introduction" 6th Edition, Hall of India, 2014.

SUGGESTED READINGS:

1. R. Panneerselvam**, "**Operations research**",** PHI Learning Pvt. Ltd.,2006.

CS 464

OPEN SOURCE TECHNOLOGIES

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course objectives:

1. Understand the difference between open source software and commercial software.
2. Familiarity with Linux operating system.
3. Understanding and development of web applications using open source web technologies like Apache, MySql and PHP (LAMP/XAMP).

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the difference between open source software and commercial software.
2. Identify, install and run Linux operating system.
3. Install and manage applications.
4. Identify, install open source web technologies Apache, MySql, PHP.
5. Develop web applications using LAMP.
6. Write session control PHP code for a website.

UNIT I

OPEN SOURCE: Introduction to Open Source – Open Source vs. Commercial Software – What is Linux? - Free Software – Where I can use Linux? Linux Kernel – Linux Distributions

UNIT II

LINUX: Introduction to Linux Essential Commands - Filesystem Concept - Standard Files
1. The Linux Security Model - Vi Editor - Partitions creation - Shell Introduction
2. String Processing - Investigating and Managing Processes - Network Clients - Installing Application

UNIT III

APACHE: Apache Explained - Starting, Stopping, and Restarting Apache - Modifying the Default Configuration - Securing Apache - Set User and Group - Consider Allowing Access to Local Documentation - Don't Allow public html Web sites - Apache control with .htaccess

UNIT IV

MYSQL: Introduction to MYSQL - The Show Databases and Table - The USE command - Create Database and Tables - Describe Table - Select, Insert, Update, and Delete statement - Some Administrative detail - Table Joins - Loading and Dumping a Database.

UNIT V

PHP: Introduction- General Syntactic Characteristics - PHP Scripting - Commenting your code - Primitives, Operations and Expressions - PHP Variables - Operations and Expressions Control Statement - Array - Functions - Basic Form Processing - File and Folder Access - Cookies - Sessions - Database Access with PHP - MySQL - MySQL Functions - Inserting Records - Selecting Records - Deleting Records - Update Records.

TEXT BOOK:

1. James Lee and Brent Ware ,"Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP", , Dorling Kindersley(India) Pvt. Ltd, 2008.

SUGGESTED READINGS:

1. Eric Rosebrock, Eric Filson ,"Setting Up LAMP: Getting Linux, Apache, MySQL, and PHP and working Together", Published by John Wiley and Sons, 2004.

WITH EFFECT FROM THE ACADEMIC YEAR 2016 - 2017

CS 465

SOFTWARE PROJECT MANAGEMENT

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Understand the fundamental principles of Software Project management & will also have a good knowledge of responsibilities of project manager and how to handle these.
2. Be familiar with the different methods and techniques used for project management.
3. To have good knowledge of the issues and challenges faced while doing the Software project Management.
4. Will be able to understand why majority of the software projects fails and how that failure probability can be reduced effectively.
5. Will be able to do the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand and practice the process of project management and its application in delivering successful IT projects.
2. Evaluate a project to develop the scope of work, provide accurate cost estimates and to plan the various activities.
3. Understand and use risk management analysis techniques that identify the factors that put a project at risk and to quantify the likely effect of risk on project timescales.
4. Identify the resources required for a project and to produce a work plan and resource schedule.
5. Monitor the progress of a project and to assess the risk of slippage, revising targets or counteract drift.
6. Distinguish between the different types of project and follow the stages needed to negotiate an appropriate contract.

UNIT I

Conventional Software Management: The Waterfall Model, Conventional software Management Performance.

Evolution of Software Economics: Software Economics, Pragmatic Software Cost Estimation.

Improving Software Economics: Reducing Software Product Size, improving software processes, improving team effectiveness, Improving Automation through Software Environments, Achieving Required Quality.
Old way and the new: The Principles of Conventional Software Engineering and Moden Software Management.

UNIT II
Life cycle phases: Engineering and Production Stages,Inception Phase, Elaboration Phase,Construction Phase, Transition Phase.
Artifacts of the process: The Artifact Sets, Management Artifacts, Engineering Artifacts, Pragmatic Artifacts.
Model based software architectures: Management Perspective,Technical Perspective.
Work Flows of the process, Checkpoints of the process.

UNIT III
Iterative Process Planning, Project Organizations and Responsibilities, Process Automation, Project Control of Process instrumentation, tailoring the Process.

UNIT IV
Modern Project Profiles, Next generation Software economics, modern process transitions, Managing Contracts, Managing People and Organizing Teams.

UNIT V
Process Improvement and Managing to the CMM, ISO 12207- an Overview, Program Management. A Case Study.

TEXT BOOK:
1. Walker Royce ,"Software Project Management" , Pearson Education, 2005.
2. Bob Hughes and Mike Cotterell ,"Software Project Management", Tata McGraw-Hill Edition-2011.

SUGGESTED READINGS:
1. Joel Henry "Software Project Management" , Pearson Education, First Edition, 2004.
2. Pankaj Jalote "Software Project Management in practice" , Pearson Education,2005.

SEMESTER-II

WITH EFFECT FROM THE ACADEMIC YEAR 2016 - 2017

CS 421

INFORMATION AND NETWORK SECURITY

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Deal with the underlying principles of information and network security.
2. Deal with the construction and cryptanalysis of block ciphers, stream ciphers and hash functions.
3. Define one way functions and trap-door functions and presents the construction and cryptanalysis of public key ciphers, namely RSA.
4. Deal with the key exchange problem and solutions using the Diffie-Hellman and Message Authentication Codes (MAC) and signature schemes.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the most common type of information and network threat sources.
2. Understand the Public-Key Infrastructure.
3. Understand security protocols for protecting data on networks.
4. Understand the information and network security issues and apply the related concepts for protection and communication privacy.
5. Understand application security using smart- cards.
6. Understand the operation of e-payments, micro- payments and related security issues, protocols.

UNIT 1

Planning for Security: Introduction, Information Security Policy, Standards, and Practices; The Information Security Blue Print; Contingency plan and a model for contingency plan
Security Technology: Introduction; Physical design; Firewalls; Protecting Remote Connections Intrusion Detection Systems (IDS); Honey Pots, Honey Nets, and Padded cell systems; Scanning and Analysis Tools.

UNIT II

Cryptography: Introduction; A short History of Cryptography; Principles of Cryptography; Cryptography Tools; Attacks on Cryptosystems.

UNIT III

Introduction to Network Security, Authentication Applications: Attacks, services, and Mechanisms; Security Attacks; Security Services; A model for Internetwork Security; Internet Standards and RFCs Kerberos, X.509 Directory Authentication Service.

UNIT IV

Electronic Mail Security: Pretty Good Privacy (PGP); S/MIME

IP Security: IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating Security Payload; Combining Security Associations; Key Management.

UNIT V

Web Security: Web security requirements; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET).

TEXT BOOKS:

1. Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, 2nd Edition, Cengage Learning, 2005.

2. William Stallings: Network Security Essentials: Applications and Standards, 3rd Edition, Pearson Education, 2007.

SUGGESTED READINGS:

1. Behrouz A. Forouzan "Cryptography and its principles".

CS 422

INFORMATION AND NETWORK SECURITY LAB

Instruction	3 per week
Duration of SEE	3 Hours
SEE	50 Marks
Sessional	25 Marks
Credits	2

Course Objectives:

1. Understand basic cryptography principles, including some well known algorithms for symmetric and public key encryption, digital signatures, key management.
2. To provide a practical exposure of both the principles and practice of advanced cryptography.
3. Understand and fulfill the requirements C.I.A .
4. Understand the underlying principles of information and network security.

Course Outcomes:

After completion of the course, student should be able to:

1. Demonstrate detailed knowledge of the role of encryption to protect data.
2. Analyze security issues arising from the use of certain types of technologies.
3. Master protocols for security services.
4. Master on the key exchange and Authentication protocols.

List of Programs:

3. Java program to perform encryption and decryption using the following algorithms
   a. Ceaser cipher b. Substitution cipher c. Hill Cipher
4. C program to implement the DES algorithm logic.
5. JAVA program to implement the DES algorithm logic.
6. JAVA program that contains functions, which accept a key and input text to be encrypted/decrypted. This program should use the key to encrypt/decrypt the input by using the triple DES algorithm. Make use of Java Cryptography package.
7. C/JAVA program to implement the Blowfish algorithm logic
8. Java program to implement RSA algorithm.
9. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
10. Calculate the message digest of a text using the MD5 algorithm in JAVA.
11. Explore the Java classes related to digital certificates.
12. Create a digital certificate of your own by using the Java key tool

TEXT BOOKS:

1. Michael Gregg "Build Your Own Security Lab" , Wiley India.

SUGGESTED READINGS:

1. Alfred Basta, Wolf Halton, "Computer Security, concepts, issues and implementation:, Cengage Learning".

CS 423

SEMINAR

Instruction	3L per week
Sessional	25 Marks
Credits	1

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for a systematic and independent study of the state of the art topics in a broad area of the specialization.

Seminar topics may be chosen by the student with advice and approval from the faculty members. Students are to be exposed to the following aspects of seminar presentation.

- Literature Survey
- Consolidation of available information
- Power point presentation
- Technical writing

Each student is required to:

1. Submit a one-page synopsis before the seminar talk for display on the notice board.
2. Give a 20 minutes presentation through power point followed by a 10 minutes discussion.
3. Submit a report on the seminar topic with list of references.

Seminars are to be scheduled from the 3rd week of to the last week of the II-semester.

For award of Sessional marks students are judged on the basis of an oral and written presentation as well as their involvement in the discussions by at least two faculty members.

CS 424

PROJECT

Instruction	6L per week
University Examination	Viva-voce
University Examination	100 Marks
Sessional	50 Marks
Credits	9

Dealing with a real time problem should be the focus of under graduate project.

All projects will be monitored at least four times in the II-semester through individual presentations (Project batch wise).

Every student should maintain a project dairy, wherein he/she needs to record the progress of his/her work and get it signed at least once in a week by the guide(s). If working outside and college campus, both the external and internal guides should sign the same.

Problems can also be invited from the industries to be worked out through undergraduate projects. Efforts may be made such that the projects may be carried out in reputed industries/ research organizations/PSUs.

Sessional marks should be based on the marks, awarded by a monitoring project committee of faculty members as well as the marks given by the guide.

Common norms should be established for final documentation of the project report by the respective department on the following lines:

1. The project title should be task oriented for example "Design and Analysis of ……."
2. Objectives of the project should be identified clearly and each student of the project batch should fulfill at least one of the objectives identified. The chapters of the project report should reflect the objectives achieved.

3. Contents of the report should include the following
    a. Title page
    b. Certificate
    c. Acknowledgements
    d. Abstract (limited to one/two paragraphs, page no.1 should start from this)
    e. Contents (Ch. No. Title of the chapter/section Page No.)
    f. List figures (Fig. No. caption of the figure Page No.)
    g. List of Tables (Table. No. Caption of the table Page No.)
    h. List of Symbols (ex. C: Velocity of light 3×10^8 m/s)

i. Chapter I should be introduction . This should contain sections as objectives of the project, technical approach, literature survey, the importance of the project and organization of the report.
j. The remaining chapters should include regarding the implementation of the project, results with discussions and conclusions. Students are expected to write about future scope of the project.
k. References should be indicated as per IEEE or standard format, which should be duly referred in the report.
l. The algorithms related to the software developed should be thoroughly discussed in Appendices

etc..

4. The project reports should be hard bound.

The project report should be evaluated for 100 Marks by the External Examiner.

The project work, if found inadequate in the external examination, the candidate should repeat the project work with a new problem or improve the quality of work and report it again.

Elective - III

WITH EFFECT FROM THE ACADEMIC YEAR 2016 - 2017

CS 471

DATA SCIENCE AND BIG DATA ANALYTICS

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Applying and understanding the big data flow for the actual projects.
2. Understands the lifecycle of the data analytics & big data ecosystem and able to apply for real world problems.
3. Acquires knowledge on the tools and techniques for solving big data analytics.
4. Learns how to apply the mining techniques on big data.

Course Outcomes:

After completion of the course, student should be able to:

1. Have a clear idea about the big data flow and its ecosystem.
2. Apply the tools and techniques on big data while applying data mining techniques.
3. Use statistical tool and statistical methods that can be applied on big data.
4. Have a clear idea about how to represent the unstructured data in the data bases.
5. Understand the common Hadoop ecosystem components, Hadoop Architecture, HDFS, Anatomy of File Write and Read, Rack Awareness.
6. Understand Hadoop Map Reduce framework and the working of MapReduce on data stored in HDFS.

UNIT 1

Introduction to Big Data Analytics: Big Data Overview, State of the Practice in Analytics, Key Roles for the New Big Data Ecosystem, Examples of Big Data Analytics.

Data Analytics Lifecycle: Data Analytics Lifecycle Overview, Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize, Case Study: Global Innovation Network and Analysis (GINA).

Review of Basic Data Analytic Methods Using R: Introduction to R, Exploratory Data Analysis, Statistical Methods for Evaluation.

UNIT II

Advanced Analytical Theory and Methods- Clustering: Overview of Clustering, K-means, Additional Algorithms.

Advanced Analytical Theory and Methods-Association Rules: Overview, Apriori Algorithm, Evaluation of Candidate Rules , Applications of Association Rules, An Example: Transactions in a Grocery Store , Validation and Testing , Diagnostics.

UNIT III

Advanced Analytical Theory and Methods- Regression : Linear Regression, Logistic Regression, Reasons to Choose and Cautions, Additional Regression Models.

Advanced Analytical Theory and Methods-Classification: Decision Trees , Naïve Bayes , Diagnostics of Classifiers, Additional Classification Methods.

UNIT IV

Advanced Analytical Theory and Methods-Time Series Analysis: Overview of Time Series Analysis, ARIMA Model, Additional Methods.

Advanced Analytical Theory and Methods-Text Analysis: Text Analysis Steps, A Text Analysis Example, Collecting Raw Text , Representing Text, Term Frequency--Inverse Document Frequency (TFIDF), Categorizing Documents by Topics, Determining Sentiments, Gaining Insights.

UNIT V

Advanced Analytics--Technology and Tools-MapReduce and Hadoop: Analytics for Unstructured Data, The Hadoop Ecosystem, NoSQL.

Advanced Analytics--Technology and Tools-In-Database Analytics: SQL Essentials, In-Database Text Analysis, Advanced SQL.

The Endgame or Putting It All Together: Communicating and Operationalizing an Analytics Project, Creating the Final Deliverables, Data Visualization Basics.

TEXT BOOKS:

1. EMC Education Services "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data" Wiley Publishers
2. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
3. Tom White " Hadoop: The Definitive Guide" Third Edition, O"reilly Media, 2011.
4. Prajapati, "V. Big data analytics with R and Hadoop", Packt Publishing Ltd, 2013.

SUGGESTED READINGS:

1. Frank J. Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley Publishers.
2. Tom Plunkett, Mark Hornick, "Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop", McGraw-Hill/Osborne Media (2013), Oracle press.
3. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007 5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.

CS 472

CLOUD COMPUTING

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To impart the fundamentals and essentials of Cloud Computing.
2. To provide students a sound foundation of the Cloud Computing so that they can adopt Cloud Computing services and tools in their real life scenarios.
3. To provide knowledge about secutrity and privacy issues related to cloud computing environments.
4. To enable students explore cloud computing driven commercial systems such as Google App Engine, Microsoft Azure and Amazon Web Services and others.

Course Outcomes:

After completion of the course, student should be able to:

1. Define Cloud Computing and related concepts and describe the characteristics, advantages, risks and challenges associated with cloud computing.
2. Explain and characterize various cloud service models, cloud deployment models and explore virtualization techniques that serve in offering software, computation and storage services on the cloud.
3. Apply the fundamental concepts in datacenters to understand the tradeoffs in power, efficiency and cost.
4. Illustrate the concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.
5. Understand the security and privacy issues related to cloud computing environments.
6. Analyze various cloud programming models and apply them to solve problems on the cloud.

UNIT I

Introduction to Cloud Computing: Cloud Computing in a Nutshell, System Models for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles of Cloud Computing, Challenges and Risks, Service Models.

UNIT II

Virtual Machines and Virtualization of Clusters and Data Centers: Levels of Virtualization, Virtualization Structures//Tools and Mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization Data-Center Automation.

Case studies: Xen Virtual machine monitors- Xen API. VMware - VMware products-Vmware Features. Microsoft Virtual Server - Features of Microsoft Virtual Server.

UNIT III

Cloud computing architectures over Virtualized Data Centers: Data-Center design and Interconnection networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, GAE, AWS, Azure, Inter-cloud Resource Management.

UNIT IV

Cloud Security and Trust Management, Data Security in the Cloud : An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud, CryptDb:Onion Encryption layers-DET,RND,OPE,JOIN,SEARCH, HOM, and Homomorphic Encryption, FPE. Trust, Reputation and Security Management.

UNIT V

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, parallel and distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Common Standards in Cloud Computing: The Open Cloud Consortium, the Distributed Management Task Force, Standards for Application Developers, Standards for Messaging. Internet Messaging Access Protocol (IMAP), Standards for Security, Examples of End-User Access to Cloud Computing.

TEXT BOOKS:

1. John W. Rittinghouse, "Cloud Computing: Implementation, Management, and Security ". James F. Ransome, CRC Press 2009.
2. Kai Hwang. Geoffrey C.Fox, Jack J. Dongarra, "Distributed and Cloud Computing From Parallel Processing to the Internet of Things", Elsevier, 2012.
3. Rajkumar Buyya, James Broberg and Andrzej M. Goscinski," Cloud Computing: Principles and Paradigms (Wiley Series on Parallel and Distributed Computing), Wiley *Publishing* ©2011.

SUGGESTED READINGS:

1. Raluca Ada Popa, Catherine M.S. Redfield, Nickolai Zeldovich, and Hari Balakrishnan, "CryptDB: Protecting Confidentiality with encrypted Query Processing"23rd ACM Symposium on Operating Systems Principles (SOSP 2011), Cascais, Portugal October 2011.
2. A Fully Homomorhic Encryption Scheme, Craig Gentry, September 2009.
3. David Marshall, Wade A. Reynolds, "Advanced Server Virtualization: VMware and Microsoft Platform in the Virtual Data Center", Auerbach Publications, 2006.
4. Web resources:

a. http://aws.amazon.com
b. http://code.google.com/appsengine
c. http://www.buyya.com/

CS 473

SEMANTIC WEB AND SOCIAL NETWORKS

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To learn Web Intelligence.
2. To explain Knowledge Representation for the Semantic Web.
3. To learn Ontology Engineering.
4. To learn Semantic Web Applications, Services and Technology.
5. To learn Social Network Analysis and semantic web.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the evolution of the web and the need of the semantic web
2. Understand the semantic web technologies such as RDF, OWL to represent knowledge
3. Understand and analyze the ontology and apply for the application with appropriate methods and tools.
4. Understand the need and applications of social network analysis and the scope of these applications in the web.
5. Analyze and explain how technical changes affect the social aspects of web based computing.
6. Create an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

UNIT I

Web Intelligence

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT II

Knowledge Representation for the Semantic Web

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT III

Ontology Engineering:

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT IV

Semantic Web Applications, Services and Technology:

Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

UNIT V

Social Network Analysis and semantic web:

What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

TEXT BOOKS:

1. Berners Lee, Godel and Turing, "Thinking on the Web ", Wiley inter science, 2008.
2. Peter Mika ,"Social Networks and the Semantic Web" , Springer, 2007.

SUGGESTED READINGS:

1. J.Davies, R.Studer, P.Warren ,"Semantic Web Technologies, Trends and Research in Ontology Based Systems" , John Wiley & Sons, 2006.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
3. Heiner Stuckenschmidt; Frank Van Harmelen "Information Sharing on the semantic Web" , Springer Publications, 2005.
4. T.Segaran, C.Evans, J.Taylor, O'Reilly "Programming the Semantic Web" , SPD,2009.

CS 474

CYBER FORENSICS

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Identify and present indicators that a cybersecurity incident has occurred.
2. Apply criminal justice methods to cybersecurity and computer forensic investigations.
3. Plan, implement, and evaluate penetration testing and ethical hacking of computer systems.
4. Identify, analyze, and mitigate threats to internal computer systems.
5. Collect, process, analyze, and present computer forensic evidence.

Course Outcomes:

After completion of the course, student should be able to:

1. Help the organization to continue its commercial activities in the event of significant information security incidents.
2. Be proficient in various forensic tools and usage of tools for disk imaging and recovery processes.
3. Design security procedures and policies.
4. Well versed in various security standards and security testing techniques.
5. Work in teams to analyze and resolve cyber security issues.
6. Apply critical thinking skills to risk analysis of computer systems.

UNIT 1

Introduction: Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology – Steps - Activities in Initial Response, Phase after detection of an incident.

UNIT II

Initial Response and forensic duplication: Initial Response & Volatile Data Collection from Windows system - Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic.
Duplicate/Qualified Forensic Duplicate of a Hard Drive.

UNIT III

Preserving and Recovering Digital Evidence: File Systems: FAT, NTFS - Forensic Analysis of File Systems – Storage Fundamentals: Storage Layer, Hard Drives Evidence Handling: Types of Evidence, Challenges in evidence handling, Overview of evidence handling procedure.

UNIT IV

Network Forensics and System investigation: Intrusion detection; Different Attacks in network, analysis Collecting Network Based Evidence - Investigating Routers - Network Protocols - Email Tracing- Internet Fraud.

Data Analysis Techniques - Investigating Live Systems (Windows & Unix) Investigating.

Hacker Tools - Ethical Issues – Cybercrime.

UNIT V

Bodies of law: Constitutional law, Criminal law, Civil law, Administrative regulations, Levels of law: Local laws, State laws, Federal laws, International laws , Levels of culpability: Intent, Knowledge, Recklessness, Negligence Level and burden of proof : Criminal versus civil cases ,Vicarious liability, Laws related to computers: CFAA, DMCA, CAN Spam, etc. Right to Information Act.

TEXT BOOKS:

1. Kevin Mandia, Chris Prosise, “Incident Response and computer forensics”, Tata McGrawHill, 2006.
2. Peter Stephenson, "Investigating Computer Crime: A Handbook for Corporate Investigations", Sept 1999.
3. Eoghan Casey, "Handbook Computer Crime Investigation's Forensic Tools and Technology", Academic Press, 1st Edition, 2001.

SUGGESTED READINGS:

1. Skoudis. E., Perlman. R. Counter Hack: A Step-by-Step Guide to Computer Attacks and Effective Defenses.Prentice Hall Professional Technical Reference. 2001.
2. Norbert Zaenglein, "Disk Detective: Secret You Must Know to Recover Information From a Computer", Paladin Press, 2000.
3. Bill Nelson, Amelia Philips and Christopher Steuart, “Guide to computer forensics investigation “Course technology, 4th edition.

CS 475

HUMAN MACHINE INTERACTION

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Design, evaluate and deploy usable, effective technologies
2. Produce a low-fidelity prototype for an interactive product based upon a simple list of interaction design principles.
3. To understand the importance of human Psychology in designing good interfaces.

Course Outcomes:

After completion of the course, student should be able to:

1. Think constructively & analytically about how to design and evaluate interactive technologies.
2. Determine the most appropriate HCI methods to meet the needs of a practical software development project.
3. Design effective interactive systems that are usable due to adherence to established guidelines.
4. Select and apply the appropriate design methodology.
5. Demonstrate understanding of Interaction between the human and computer components.
6. Design innovative, user centric and user friendly interfaces.

UNIT I

Interaction Paradigms: Computing Environments, Analyzing Interaction Paradigms.
Interaction Frameworks and Styles: Frameworks for Understanding Interaction, Coping with Complexity, Interaction Styles.

UNIT II

Interaction Design Process: Iterative Design, User-Centered Design, Interaction Design Models, Overview of Interaction Design Models.
Discovery: Discovery Phase Framework, Collection, Interpretation , Documentation.
Design: Conceptual Design, Physical Design, Evaluation, Interface Design Standards, Designing the Facets of the Interface.

UNIT III

Design Principles: Principles of Interaction Design, Comprehensibility, Learnability, Effectiveness/Usefulness, Efficiency/Usability, Grouping, Stimulus Intensity , Proportion , Screen Complexity, Resolution/Closure, Usability Goals.

Interaction Design Models: Model Human Processor , Keyboard Level Model, GOMS, Modeling Structure, Modeling Dynamics, Physical Models.

Usability Testing: Usability, Usability Test, Design the Test, Prepare for the Test, Perform the Test, Process the Data.

UNIT IV

Interface Components: The WIMP Interface, Other Components.

Icons : Human Issues Concerning Icons, Using Icons in Interaction Design, Technical Issues Concerning Icons.

Color: The Human Perceptual System, Using Color in Interaction Design, Color Concerns for Interaction Design, Technical Issues Concerning Color.

UNIT V

Text : Human Issues Concerning Text, Using Text in Interaction Design, Technical Issues Concerning Text.

Speech and Hearing : The Human Perceptual System, Using Sound in Interaction Design, Technical Issues Concerning Sound.

Touch and Movement: The Human Perceptual System, Using Haptics in Interaction Design, Technical Issues Concerning Haptics.

TEXT BOOKS:

1. Steven Heim, "The Resonant Interface: HCI Foundations for Interaction Design", Addison-Wesley, 2007.
2. J. Preece, Y. Rogers, and H. Sharp, Interaction Design: "Beyond Human-Computer Interaction", Wiley & Sons, 2nd Ed., 2007.

SUGGESTED READINGS:

1. Ben Shneiderman , Catherine Plaisant, "Designing the User Interface: Strategies for Effective Human-Computer Interaction", 5th edition, , Addison-Wesley, 2009.
2. Alan Dix, “Human-computer Interaction” Pearson/Prentice-Hall, 2004.

CS 476

SOFTWARE REUSE TECHNIQUES

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To explain the benefits of software reuse.
2. To discuss several different ways to implement software reuse.
3. To explain how reusable concepts can be represented as patterns.
4. To comprehend the nature of design patterns.
5. To provide a specific context for each pattern in which it is applied.

Course Outcomes:

After completion of the course, student should be able to:

1. Identify and describe the different approaches and techniques to the software reuse development.
2. Determine and apply the knowledge acquired on software reuse techniques.
3. Apply the design patterns in creating an object oriented design.
4. Use design patterns for real world situations.
5. List consequences of applying each pattern.

UNIT I

Software reuse success factors: Reuse driven software engineering as business, object oriented software engineering, Applications and Component subsystems, Use case components, Object components.

UNIT II

Design Patterns : Introduction, Creational Patterns – Factory, factory method, abstract factory, singleton, builder, prototype.

UNIT III

Structural Patterns : Adapter, bridge, composite, decorator, façade, flyweight, proxy. Behavioral Patterns : Chain of responsibility, command, interpreter.

UNIT IV

Behavioral Patterns : Iterator, mediator, memento, observer, state, strategy, template, visitor. Other design patterns : Whole – part, master – slave, view handler, forwarder – receiver, client dispatcher – server, publisher – subscriber.

UNIT V

Architectural Patterns – Layers, pipes and filters, black board, broker, model-view controller, presentation – abstraction – control, micro kernel, reflection.

TEXT BOOKS:

1. Ivar Jacabson, Martin Griss, Patrick Johnson, “Software Reuse: Architecture, Process and Organization for Business Success”, ACM Press 1997.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides – “ Design Patterns”, Pearson Education, 1995.

SUGGESTED READINGS:

1. Frank Buschmann etc., - “Pattern Oriented Software Architecture – Volume I”, Wiley 1996.
2. James W Cooper, “Java Design Patterns, a tutorial”, Pearson Education, 2000.

Elective – IV

WITH EFFECT FROM THE ACADEMIC YEAR 2016 - 2017

CS 481

PATTERN RECOGNITION

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To introduce the students about fundamentals of image formation.
2. To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition.
3. To develop an appreciation for various issues in the design of computer vision and object recognition systems.
4. To provide the students with computer vision and object recognition applications.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand the fundamentals of image formation.
2. Comprehend the major ideas, methods and techniques of image processing and computer vision.
3. Understand typical pattern recognition techniques for object recognition.
4. Implement the basic image processing and computer vision techniques.
5. Develop simple object recognition systems.
6. Implement simple pattern classifier, classifier combination and structural pattern recognizers.

Unit I

Classifiers Based on Bayes Decision Theory: Introduction , Bayes Decision Theory, Discriminant Functions and Decision Surfaces , Bayesian Classification for Normal Distributions.

Estimation of Unknown Probability Density Functions: Maximum Likelihood Parameter Estimation , Maximum a Posteriori Probability Estimation, Bayesian Inference , Maximum Entropy Estimation , Mixture Models , Nonparametric Estimation ,The Naive-Bayes Classifier , The Nearest Neighbor Rule, Bayesian Networks.

Unit II

Linear Classifiers: Linear Discriminant Functions and Decision Hyperplanes, The Perceptron Algorithm , Least Square Methods.

Mean Square Estimation Revisited: Logistic Discrimination, Support Vector Machines.

Unit III

Non Linear Classifiers: The XOR Problem , The Two-Layer Perceptron , Three Layer Perceptrons.

Algorithms Based on Exact Classification of the Training Set: The Backpropagation Algorithm , Variations on the Backpropagation Theme, The Cost Function Choice, Choice of the Network Size, A Simulation Example , Networks with Weight Sharing, Generalized Linear Classifiers, Capacity of the *l*-Dimensional Space in Linear Dichotomies, Polynomial Classifiers, Radial Basis Function Networks, Universal Approximators.

Support Vector Machines: The nonlinear Case, Decision Trees, Combining Classifiers , The Boosting Approach to Combine Classifiers.

Unit IV

Feature Selection: Preprocessing, Feature Selection Based on Statistical Hypothesis Testing, The Receiver Operating Characteristics (ROC) Curve , Class Separability Measures , Feature Subset Selection , Optimal Feature Generation , Neural Networks and Feature Generation / Selection, The Bayesian Information Criterion.

Feature Generation: Linear Transforms, Regional Features, Features for Shape and Size Characterization, Typical Features for Speech and Audio Classification.

Unit V

Template Matching: Introduction, Similarity Measures Based on Optimal Path Searching Techniques, Measures Based on Correlations, Deformable Template Models.

Context Dependent Classification: Markov Chain Models, Hidden Markov Models.

Clustering Algorithms: Clustering Algorithms Based on Graph Theory, Competitive Learning Algorithms: Supervised Learning Vector Quantization.

TEXT BOOKS:

1. S Theodoridis and K Koutroumbas ,"Pattern Recognition", 4th Edition, Academic Press, 2009.
2. C Bishop ," Pattern Recognition and Machine Learning" ,Springer , 2006.

SUGGESTED READINGS:

1. Theodoridis & Koutroumbas, **"**Pattern Recognition**",** Academic Press, 4th Edition,2014.

CS 482

BIO INFORMATICS

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. To understand the basic concepts.
2. To search information, visualize it.
3. To learn various bioinformatics algorithms.
4. To understand data mining techniques.
5. To study various pattern matching techniques.

Course Outcomes:

After completion of the course, student should be able to:

1. Have a basic idea of BioInformatics.
2. Retrieve information using various algorithms.
3. Apply data mining and pattern matching techniques.
4. Sequence the databases.
5. Do modeling and simulation.
6. Understand social, legal, and privacy implications of electronic storage and sharing of biological information.

UNIT I

Introductory concepts:

The Central Dogma – The Killer Application – Parallel Universes – Watson's Definition – Top Down Versus Bottom up – Information Flow – Convergence – Databases – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks – Geographical Scope – Communication Models – Transmissions Technology – Protocols – Bandwidth – Topology – Hardware – Contents – Security – Ownership – Implementation – Management.

UNIT II

Search engines, visualization and algorithms:

The search process – Search Engine Technology – Searching and Information Theory – Computational methods – Search Engines and Knowledge Management – Data Visualization – sequence visualization – structure visualization – user Interface –Animation Versus simulation – General Purpose Technologies - Exhaustive search – Greedy – Dynamic programming – divide and Conquer – graph algorithms.

UNIT III

Statistics and data mining:

Statistical concepts – Microarrays – Imperfect Data – Randomness – Variability – Approximation – Interface Noise – Assumptions – Sampling and Distributions – Hypothesis

Testing – Quantifying Randomness – Data Analysis – Tool selection statistics of Alignment – Clustering and Classification – Data Mining – Methods –Selection and Sampling – Preprocessing and Cleaning – Transformation and Reduction – Data Mining Methods – Evaluation – Visualization – Designing new queries – Pattern Recognition and Discovery – Machine Learning – Text Mining – Tools.

UNIT IV

Pattern matching:

Pairwise sequence alignment – Local versus global alignment – Multiple sequence alignment – Computational methods – Dot Matrix analysis – Substitution matrices –Dynamic Programming – Word methods – Bayesian methods – Multiple sequence alignment – Dynamic Programming – Progressive strategies – Iterative strategies –Tools – Nucleotide Pattern Matching – Polypeptide pattern matching – Utilities –Sequence Databases.

UNIT V

Modeling and simulation:

Drug Discovery – components – process – Perspectives – Numeric considerations – Algorithms – Hardware – Issues – Protein structure – Abinitio Methods – Heuristic methods – Systems Biology – Tools – Collaboration and Communications – standards -Issues – Security – Intellectual property.

TEXT BOOKS:

1. Bryan Bergeron, “Bio Informatics Computing”, Second Edition, Pearson Education, 2015.
2. T.K.Attwood and D.J. Perry Smith, “Introduction to Bio Informatics, Longman Essen,1999.

SUGGESTED READINGS:

1. Neil C.Jones, PaveA. Pevzner, ”An Introduction to, Bioinformatics Algorithms (Computational Molecular Biology)” , MIT Press 2004.

CS 483

MACHINE LEARNING

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. Understand the basic underlying concepts for supervised discriminative and generative learning.
2. Understand the concepts of cross-validation and regularization, be able to use them for estimation of algorithm parameters.
3. Characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
4. Understand algorithms for learning Bayesian networks.
5. Understand genetic algorithm , operators and programming techniques.
6. Understand and apply unsupervised algorithms for clustering.

Course Outcomes:

After completion of the course, student should be able to:

1. Understand a wide variety of learning algorithms.
2. Understand how to apply a variety of learning algorithms to data.
3. Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
4. Understand how to perform evaluation of learning algorithms and model selection.
5. Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
6. Gets a knowledge of clustering concepts.

UNIT I

Introduction: Learning, Types of Machine Learning. Concept learning: Introduction, Version Spaces and the Candidate Elimination Algorithm. Learning with Trees: Constructing Decision Trees, CART, Classification example.

UNIT II

Linear Discriminants: The Perceptron, Linear Separability. Linear Regression.
Multilayer Perceptron (MLP): Going Forwards, Backwards, MLP in practices, Deriving back. Propagation SUPPORT Vector Machines: Optimal Separation, Kernels.

UNIT III

Some Basic Statistics: Averages, Variance and Covariance, The Gaussian.
The Bias-Variance Tradeoff Bayesian learning: Introduction, Bayes theorem, Bayes Optimal Classifier, Naive Bayes Classifier.

Graphical Models: Bayesian networks, Approximate Inference, Making Bayesian Networks, Hidden Markov Models, The Forward Algorithm.

UNIT IV

Evolutionary Learning: Genetic Algorithms, Genetic Operators.
Genetic Programming Ensemble learning: Boosting, Bagging.
Dimensionality Reduction: Linear Discriminant Analysis, Principal Component Analysis

UNIT V

Clustering: Introduction, Similarity and Distance Measures, Outliers, Hierarchical Methods, Partitional Algorithms, Clustering Large Databases, Clustering with Categorical Attributes, Comparison.

TEXT BOOKS:

1. Tom M. Mitchell, "Machine Learning ",MacGraw Hill, 1997.
2. Stephen Marsland, "Machine Learning - An Algorithmic Perspective ", CRC Press, 2009.

SUGGESTED READINGS:

1. Margaret H Dunham, "Data Mining", Pearson Edition, 2003.
2. Galit Shmueli, Nitin R Patel, Peter C Bruce, "Data Mining for Business Intelligence", Wiley India Edition, 2007.
3. Rajjall Shinghal, "Pattern Recognition ", Oxford University Press, 2006.

CS 484

BUSINESS INTELLIGENCE

Instruction	4L per week
Duration of SEE	3 Hours
SEE	75 Marks
Sessional	25 Marks
Credits	3

Course Objectives:

1. This course focuses on how to design and build a Business Intelligence solution.
2. Students will also learn how to design and build a Data Warehouse
3. Students can develop their own projects within collaborative teams or can be assigned an existing data source to develop a project.
4. To ensure success during the implementation phase, students will plan for and gather business requirements, as well as design the data warehouse in order to develop an effective BI plan.

Course Outcomes:

After completion of the course, student should be able to:

1. Design and implementation of OLTP, OLAP and Warehouses.
2. Use ETL concepts, tools and techniques to perform Extraction, Transformation, and Loading of data.
3. Report the usable data by using various reporting concepts, techniques/tools, and use charts, tables.
4. Use Analytics concepts like data mining, Exploratory and statistical techniques for predictive analysis in Business Intelligence.
5. Acquire the knowledge of data visualization techniques.
6. Get a view of future trends of business intelligence.

UNIT I

An Overview of Business Intelligence, Analytics, and Decision Support-Changing Business Environments and Computerized Decision Support, A Framework for Business Intelligence (Bl), Intelligence Creation, Use, and Bl Governance, Transaction Processing Versus Analytic Processing, Successful Bl Implementation, Analytics Overview, Brief Introduction to Big Data Analytics.

UNIT II

Data Warehousing Definitions and Concepts, Data Warehousing Architectures, Data Integration and the Extraction, Transformation, and Load (ETL) Processes, Data Warehouse Development, Data Warehousing Implementation Issues, Real-Time Data Warehousing, Data Warehouse Administration, Security Issues, and Future Trends, Business Reporting, Visual Analytics, and Business Performance Management- Business Reporting Definitions and Concepts, Data and Information Visualization, Different Types of Charts and Graphs, The Emergence of Data Visualization and Visual Analytics, Performance Dashboards, Business Performance Management, Performance Measurement.

UNIT III

Data Mining- Data Mining Concepts and Applications, Data Mining Applications, Data Mining Process, Data Mining Methods, Data Mining Software Tools, Data Mining Privacy Issues, Myths, and Blunders, Text and Web Analytics, Text Analytics and Text Mining Overview- Natural Language Processing, Text Mining Applications, Text Mining Proces, Sentiment Analysis, Web Mining Overview, Search Engines, Web Usage Mining (Web Analytics), Social Analytics.

UNIT IV

Big Data and Analytics, Definition of Big Data- Fundamentals of Big Data Analytics, Big Data Technologies, Data Scientist, Big Data and Data Warehousing, Big Data Vendors, Big Data And Stream Analytics, Applications of Stream Analytics.

UNIT V

Business Analytics: Emerging Trends and Future Impact- Location-Based Analytics for Organizations, Analytics Applications for Consumers, The Web 2.0 Revolution and Online Social Networking, Cloud Computing and Bl, Impacts of Analytics In Organizations, Issues of Legality, Privacy, and Ethics, An Overview of the Analytics Ecosystem.

TEXT BOOKS:

1. Ramesh Sharda Oklahoma State University, et.all "BUSINESS INTELLIGENCE" Pearson education, Third edition, 2014.
2. R.N. Prasad, Seema Acharya, "Fundamentals of Business Analytics", Weily First Edition, 2011.

SUGGESTED READINGS:

1. William Inmon, "Building the Data Warehouse", Wiley publication 4 th edition, 2004.
2. Efrem G. Mallach, "Decision Support And Data Warehouse Systems", 1st Edition Publisher: Tata McGraw-Hill Education,. ISBN-10: 0072899816, 2002.
3. Efraim Turban, Ramesh Sharda, Dursun Delen, David King, "Business Intelligence", ISBN-10: 013610066X Publisher: Prentice Hall.ISBN-13: 9780136100669, 2010.
4. Dorian Pyle, "Business Modeling and Data Mining", Elsevier Publication MK, 2003.
5. Reema Thareja, "Data Warehouse", Publisher: Oxford University Press, 2009.

With Effect from the Academic Year 2016 - 2017

ME 472

INTELLECTUAL PROPERTY RIGHTS

Instruction	4	Periods per week
Duration of End Examination	3	Hours
End examination	75	Marks
Sessionals	25	Marks
Credits	3	

Course Objectives:

1. To introduce fundamental aspects of IP
2. Introducing all aspects of IPR acts.
3. Creating awareness of multi disciplinary audience
4. Creating awareness for innovation and its importance
5. Exposing to the changes in IPR culture
6. Awareness about techno-business aspects of IPR

Course Outcomes:

After completion of the course, student should be able to:

1. Respect intellectual property of others
2. Learn the art of understanding IPR
3. Develop the capability of searching the stage of innovations.
4. Capable of filing a patent document independently.
5. Completely understand the techno-legal business angle of IP. .
6. Capable of converting creativity into IP and effectively protect it.

UNIT-I

Overview of Intellectual Property: Introduction and the need for intellectual property right (IPR), IPR in India – Genesis and Development, IPR abroad, Some important examples of IPR. Importance of WTO, TRIPS agreement, International Conventions and PCT

Patents: Macro economic impact of the patent system, Patent and kind of inventions protected by a patent, Patent document, How to protect your inventions? Granting of patent, Rights of a patent, how extensive is patent protection? Why protect inventions by patents? Searching a patent, Drafting of a patent, Filing of a patent, the different layers of the international patent system, (national, regional and international options), compulsory licensing and licensers of right & revocation, Utility models, Differences between a utility model and a patent? Trade secrets and know-how agreements

UNIT-II

Industrial Designs: What is an industrial design? How can industrial designs be protected? What kind of protection is provided by industrial designs? How long does the protection last? Why protect industrial designs?

UNIT-III

Trademarks: What is a trademark? Rights of trademark? What kind of signs can be used as trademarks? Types of trademark, function does a trademark perform, How is a trademark protected? How is a trademark registered? How long is a registered trademark protected for? How extensive is trademark protection? What are well-known marks and how are they protected? Domain name and how does it relate to trademarks? Trademark infringement and passing off.

UNIT-IV

Copyright: What is copyright? What is covered by copyright? How long does copyright last? Why protect copyright? Related Rights: what are related rights? Distinction between related rights and copyright? Rights covered by copyright? Copy rights in computer programming.

UNIT-V

Enforcement of Intellectual Property Rights: Infringement of intellectual property rights Enforcement Measures Emerging issues in Intellectual property protection. Case studies of patents and IP Protection.

Unfair Competition: What is unfair competition? Relationship between unfair competition and intellectual property laws?

TEXT BOOKS:

1. Ajit Parulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India ltd , 2006
2. B. L.Wadehra; Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000
3. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi 2010

SUGGESTED READING:

4. Cronish W.R1 Intellectual Property; Patents, copyright, Trad and Allied rights, Sweet & Maxwell, 1993.
5. P. Narayanan, Intellectual Property Law, Eastern Law Edn., 1997.
6. Robin Jacob and Daniel Alexander, A Guide Book to Intellectual Property Patents, Trademarks, Copy rights and designs, Sweet, Maxwell 4th Edition.

CE-422

DISASTER MITIGATION AND MANAGEMENT

Instruction	4 Periods per week
Duration of Main Examination	3 Hours
Main Examination	75 Marks
Sessionals	25 Marks
Credits	3

Course Objectives:

1. To equip the students with the basic knowledge of hazards, disasters, risks and vulnerabilities including natural, climatic and human induced factors and associated impacts.
2. To impart knowledge in students about the nature, mechanism causes, consequences and mitigation measures of the various natural disasters including hydro metrological and geological based disasters.
3. To enable the students to understand risks, vulnerabilities and human errors associated with human induced disasters including chemical, biological and nuclear warfare agents.
4. To equip the students with the knowledge of various chronological phases in the disaster management cycle.
5. To create awareness about the disaster management framework and legislations in the context of national and global conventions.
6. To enable students to understand the applications of geospatial technologies like remote sensing and geographical information systems in disaster management.

Course Outcomes:

After completion of the course, student should be able to:

1. Analyse and critically examine existing programs in disaster management regarding vulnerability, risk and capacity at local level
2. Choose the appropriate activities and tools and set up priorities to build a coherent and adapted disaster management plan.
3. Understand various mechanisms and consequences of natural and human induced disasters for the participatory role of engineers in disaster management.
4. Develop an awareness of the chronological phases of disaster preparedness, response and relief operations for formulating effective disaster management plans
5. Understand various participatory approaches/strategies and their application in disaster management
6. Understand the concepts of remote sensing and geographical information systems for their effective application in disaster management.

UNIT-I

Introduction to Natural, human induced and human made disasters – Meaning, nature, types and effects; International decade of natural disaster reduction (IDNDR); International strategy of natural disaster reduction (ISDR).

UNIT-II

Natural Disasters– Hydro meteorological disasters: Causes, impacts, Early warning systems, structural and non-structural measures for floods, drought and cyclones; Tropical cyclones: Overview, cyclogenesis, drought monitoring and management.; Geographical based disasters: Earthquakes and Tsunami- Overview, causes, impacts, zoning, structural and non-structural mitigation measures; Tsunami generation; Landslides and avalanches: Overview, causes, impacts, zoning and mitigation measures. Case studies related to various hydro meteorological and geographical based disasters.

UNIT III

Human induced hazards: Risks and control measures in a chemical industry**,** Causes, impacts and mitigation measures for chemical accidents, chemical disaster management, current status and perspectives; Case studies related to various chemical industrial hazards eg: Bhopal gas tragedy; Management of chemical terrorism disasters and biological disasters; Radiological Emergencies and case studies; Case studies related to major power break downs, fire accidents and traffic accidents.

UNIT IV

Use of remote sensing and GIS in disaster mitigation and management; Scope of application of ICST (Information, communication and space technologies in disaster management, Critical applications& Infrastructure; Potential application of Remote sensing and GIS in disaster management and in various disastrous conditions like earthquakes, drought, Floods, landslides etc.

UNIT V

Concept of Disaster Management: Introduction to disaster management, Relationship between Risk, vulnerability and a disaster, Disaster management cycle, Principles of disaster mitigation: Hazard identification and vulnerability analysis, Early warning systems and forecasting; Infrastructure and development in disaster management; Disaster management in India: National disaster management framework at central, state, district and local levels. Community based disaster management.

TEXT BOOKS :

1. Rajib, S and Krishna Murthy, R.R (2012), "Disaster Management Global Challenges and Local Solutions" Universities Press Hyderabad.
2. Notes / Reading material published by National Disaster Management Institute, Ministry of Home Affairs, Govt. of India.

SUGGESTED READING:

1. Navele, P & Raja, C.K. (2009), Earth and Atmospheric Disasters Management, Natural and Manmade. B.S. Publications, Hyderabad.
2. Fearn-Banks, K (2011), Crises computations approach: A case book approach. Route ledge Publishers, Special Indian Education, New York & London.
3. Battacharya, T. (2012), Disaster Science and Management. Tata McGraw Hill Company, New Delhi.

With Effect from the Academic Year 2016 - 2017

ME 464

Entrepreneurship (Elective – II) (for Mech, Prod, Civil, EEE & CSE)

Instruction	4 Periods per week
Duration of End Examination	3 Hours
End examination	75 Marks
Sessionals	25 Marks
Credits	3

Objectives:

1. To understand the essence of Entrepreneurship
2. To know the environment of industry and related opportunities and challenges
3. To know the concept a procedure of idea generation
4. To understand the elements of business plan and its procedure
5. To understand project management and its techniques
6. To know behavioral issues and Time management

Outcomes: After completing this course, students will be able to:

1. Apply the entrepreneurial process
2. Analyze the feasibility of a new business plan and preparation of Business plan
3. Evaluate entrepreneurial tendency and attitude
4. Brainstorm ideas for new and innovative products or services
5. Use project management techniques like PERT and CPM
6. Analyze behavioural aspects and use time management matrix

UNIT-I

Indian Industrial Environment: Competence, Opportunities and Challenges, Entrepreneurship and Economic growth, Small Scale Industry in India, Objectives, Linkage among small, medium and heavy industries, Types of enterprises, Corporate Social Responsibility.

UNIT-II

Identification and characteristics of entrepreneurs: First generation entrepreneurs, environmental influence and women entrepreneurs, Conception and evaluation of ideas and their sources, Selection of Technology, Collaborative interaction for Technology development.

UNIT-III

Business plan: Introduction, Elements of Business Plan and its salient features, Technical Analysis, Profitability and Financial Analysis, Marketing Analysis, Feasibility studies, Executive Summary.

UNIT-IV

Project Management: During construction phase, project organization, project planning and control using CPM, PERT techniques, Human aspects of project management, Assessment of tax burden

UNIT-V

Behavioral aspects of entrepreneurs: Personality, determinants, attributes and models, Leadership concepts and models, Values and attitudes, Motivation aspects, Change behavior

Time Management: Approaches of time management, their strengths and weaknesses. Time management matrix and the urgency addiction

Text Books:

1. Vasant Desai, "Dynamics of Entrepreneurial Development and Management", Himalaya Publishing House, 1997.
2. Prasanna Chandra, "Project-Planning, Analysis, Selection, Implementation and Review", Tata Mcgraw-Hill Publishing Company Ltd. 1995.
3. S.S. Khanka, "Entrepreneurial Development", S. Chand & Co. Pvt. Ltd., New Delhi

Suggested Reading:

1. Robert D. Hisrich, Michael P. Peters, "Entrepreneurship", Tata Me Graw Hill Publishing Company Ltd., 5lh Ed., 2005
2. Stephen R. Covey and A. Roger Merrill, "First Things First", Simon and Schuster Publication, 1994.
3. Sudha G.S., "Organizational Behavior", National Publishing House, 1996.