R.V.R. & J.C. COLLEGE OF ENGINEERING, CHOWDAVARAM, GUNTUR-522 019
(AUTONOMOUS)

(w.e.f. the batch of students admitted during the academic year 2016-17)

B.TECH. IN INFORMATION TECHNOLOGY

I YEAR (I SEMESTER):

Code No.	Subject Name	Scheme of Instruction periods per week		Scheme of Examination				Category Code
		Theory + Tutorial	Practi-cal's	Duration of Sem End Exam.(hrs)	Sessi-onal Marks	Semester End Exam. Marks	Credits	
IT/CS 101	Differential Equations & Transforms	4	-	3	40	60	3	BS
IT/CE/ChE/ CS/EC/EE/ME 102	Engineering Physics	4	-	3	40	60	3	BS
IT/CE/CS/EC /EE/ME 103	Applied Chemistry	4	-	3	40	60	3	BS
IT/CE/ChE/ CS/EC/EE/ ME 104	Environmental Studies	4	-	3	40	60	3	HS
IT/CE/CS/EE/ ME 105	Problem Solving with C	4+1	-	3	40	60	3	PC
IT/CS 106	Mechanics for Engineers	4	-	3	40	60	3	ES
IT 151	Physics Laboratory	-	3	3	40	60	2	BS
IT 152	C - Programming Lab	-	3	3	40	60	2	PC
IT 153	Communication skills Lab	-	3	3	40	60	2	HS
	Total	25	9	-	360	540	24	

I YEAR (II SEMESTER):

Code No.	Subject Name	Scheme of Instruction periods per week		Scheme of Examination				Category Code
		Theory + Tutorial	Practi-cal's	Duration of Sem End Exam.(hrs)	Sessi-onal Marks	Semester End Exam. Marks	Credits	
IT/CS 107	Matrix Algebra & Numerical Analysis	4	-	3	40	60	3	BS
IT/CS/EC/ EE 108	Electronic and Electrical Engineering Materials	4	-	3	40	60	3	BS
IT/CE/CS/ EC/EE/ME 109	Chemistry for Engineering Materials	4	-	3	40	60	3	BS
IT/CE/ChE/ CS/EC/EE/ ME 110	English for Communication	4	-	3	40	60	3	HS
IT/CS 111	Programming	4+1	-	3	40	60	3	PC
IT/CS 112	Professional Ethics & Human Values	4	-	3	40	60	3	HS
IT 154	Chemistry Laboratory	-	3	3	40	60	2	BS
IT 155	Object Oriented Programming Lab	-	3	3	40	60	2	PC
IT 156	Engineering Graphics Lab	2	4	3	40	60	2	ES
	Total	27	10	-	360	540	24	

II YEAR (I SEMESTER):

Code No.	Subject Name	Scheme of Instruction periods per week		Scheme of Examination				Category Code
		Theory + Tutorial	Practi-cal's	Duration of Sem End Exam.(hrs)	Sessional Marks	Semester End Exam. Marks	Credits	
IT/CS 201	Probability - Statistics & Random Processes	4	-	3	40	60	3	BS
IT/CS 202	Basic Electrical & Electronics Engineering	4	-	3	40	60	3	ES
IT/CS 203	Digital Logic Design	4	-	3	40	60	3	ES
IT/CS 204	Data Structures	4+1	-	3	40	60	3	PC
IT/CS 205	Computer Organization	4	-	3	40	60	3	PC
IT/CS 206*	Discrete Mathematical Structures	4+1	-	3	40	60	3	PC
IT 251	Basic Electrical & Electronics Engineering Lab	-	3	3	40	60	2	ES
IT 252	Data Structures Lab	-	3	3	40	60	2	PC
IT 253	Professional Communication Skills Lab	-	3	3	40	60	2	HS
	Total	26	9	-	360	540	24	

Enrollment of NCC/NSO/NSS will be initiated from the date of commencement of class work for II Year I Semester.

***Subjects, which are offered in both I & II Semesters:**

IT/CS 206: Discrete Mathematical Structures

IT/CS 212: Operating Systems

II YEAR(II SEMESTER) :

Code No.	Subject Name	Scheme of Instruction periods per week		Scheme of Examination				Category code
		Theory + Tutorial	Practi-cal's	Duration of Sem End Exam.(hrs)	Sess-ional Marks	Semester End Exam. Marks	Credits	
IT/CS 207	Number Theory and Algebra	4	-	3	40	60	3	BS
IT/CS 208	Microprocessors & Interfacing	4	-	3	40	60	3	ES
IT/CS 209	Theory of Computation	4	-	3	40	60	3	PC
IT/CS 210	Database Management Systems	4+1	-	3	40	60	3	PC
IT/CS 211	JAVA Programming	4+1	-	3	40	60	3	PC
IT/CS 212*	Operating Systems	4	-	3	40	60	3	PC
IT 254	Microprocessors & Interfacing Lab	-	3	3	40	60	2	ES
IT 255	Database Management Systems Lab	-	3	3	40	60	2	PC
IT 256	JAVA Programming Lab	-	3	3	40	60	2	PC
	Total	26	9	-	360	540	24	

Enrollment of Internship/Industrial Training/Certificate course will be initiated from the end of the II year II semester.

***Subjects, which are offered in both I & II Semesters:**

IT/CS 206: Discrete Mathematical Structures

IT/CS 212: Operating Systems

III YEAR(I SEMESTER) :

Code No.	Subject Name	Scheme of Instruction periods per week		Scheme of Examination				Category Code
		Theory + Tutorial	Practi-cal's	Duration of Sem End Exam.(hrs)	Sessi-onal Marks	Semester End Exam. Marks	credits	
IT/CS 301	Computer Networks	4	-	3	40	60	3	PC
IT/CS 302	Web Technologies	4+1	-	3	40	60	3	PC
IT/CS 303	Design & Analysis of Algorithms	4+1	-	3	40	60	3	PC
IT/CS 304	UNIX Programming	4+1	-	3	40	60	3	PC
IT/CS 305*	Compiler Design	4	-	3	40	60	3	PC
IT/CS 306*	Software Engineering	4	-	3	40	60	3	PC
IT 351	Web Technologies Lab	-	3	3	40	60	2	PC
IT 352	Design & Analysis of Algorithms Lab	-	3	3	40	60	2	PC
IT 353	UNIX Programming Lab	-	3	3	40	60	2	PC
Total	27	9	-	360	540	24		

Enrolment of MOOCS course will be initiated from the date of commencement of class work for III Year I semester.

***Subjects, which are offered in both I & II Semesters:**

IT/CS 305 : Compiler Design

IT/CS 306 : Software Engineering

IT 311/A,B,C,D : Elective –I (Refer III year II Semester)

IT 312/A,B,C,D : Elective –II (Refer III year II Semester)

III YEAR(II SEMESTER) :

Code No.	Subject Name	Scheme of Instruction periods per week		Scheme of Examination				Category Code
		Theory + Tutorial	Practi-cal's	Duration of Sem End Exam.(hrs)	Sessi-onal Marks	Semester End Exam. Marks	credits	
IT/CS 307	Network Programming	4+1	-	3	40	60	3	PC
IT/CS 308	Data Engineering	4+1	-	3	40	60	3	PC
IT/CS 309	Object Oriented Analysis & Design	4+1	-	3	40	60	3	PC
IT/CS 310	Cryptography & Network Security	4	-	3	40	60	3	PC
IT 311*	Elective - I	4	-	3	40	60	3	PE
IT 312*	Elective - II	4	-	3	40	60	3	PE
IT 354	Network Programming Lab	-	3	3	40	60	2	PC
IT 355	Data Engineering Lab	-	3	3	40	60	2	PC
IT 356	Object Oriented Analysis & Design Lab	-	3	3	40	60	2	PC
Total		27	9	-	360	540	24	

NCC/NSO/NSS Certificate must be submitted on or before the last instruc-tion day of III Year II Semester otherwise his/her Semester End Examination result will not be declared.

Elective – I
Elective – II

IT/CS 311	(A) – Artificial Intelligence	IT/CS 312	(A) – Embedded Systems
IT/CS 311	(B) – Principles of Programming Languages	IT/CS 312	(B) – ADBMS
IT 311	(C) – Multimedia Systems	IT 312	(C) – Graph Theory
IT 311	(D) – Mobile Computing	IT 312	(D) – Industry Related Subject

***Subjects, which are offered in both I & II Semesters:**

IT/CS 305 : Compiler Design
IT/CS 306 : Software Engineering
IT 311/A,B,C,D : Elective -I
IT 312/A,B,C,D : Elective –II

IV YEAR (I SEMESTER):

Code No.	Subject Name	Scheme of Instruction periods per week		Scheme of Examination				Category Code
		Theory + Tutorial	Practi-cal's	Duration of Sem End Exam.(hrs)	Sessi-onal Marks	Semester End Exam. Marks	Credits	
IT/CS 401	Distributed Systems	4	-	3	40	60	3	PC
IT/CS 402	Web Services	4+1	-	3	40	60	3	PC
IT/CS 403	MOOCS	-	-	-	-	-	0	PC
IT 404	Elective-III (Open Elective)	4	-	3	40	60	3	OE
IT 405*	Interactive Computer Graphics	4	-	3	40	60	3	PC
IT 406*	Elective - IV	4+1	-	3	40	60	3	PE
IT 451	Mini Project/Term Paper	-	3	-	100	-	2	PC
IT 452	Web Services Lab	-	3	3	40	60	2	PC
IT 453	Elective-IV Lab	-	3	3	40	60	2	PE
Total		22	9	-	380	420	21	

MOOCS Course Certificate must be submitted on or before the last instruc-tion day of IV Year I semester otherwise his/her Semester End Examination result will not be declared.

Enrollment of Internship/Industrial Training/Certificate course completion certificate must be submitted on or before the last instruction day of IV year II semester otherwise His/Her Semester End Examination Result will not declared.

Elective – III (Open Elective)
CE 404/A BASIC SURVEYING
CE 404/B BUILDING MATERIALS & ESTIMATION
CH 404/A ENERGY ENGINEERING
CH 404/B BIO - FUELS
EC-404/A APPLIED ELECTRONICS
EC-404/B BASIC COMMUNICATION
EE 404/A Non-conventional Energy Sources
EE 404/B Utilization of Electrical Energy
ME 404/A ROBOTICS
ME 404/B OPERATIONS RESEARCH

Elective-IV
IT/CS 406 (A) – Open Source Systems
IT/CS 406 (B) – .Net Technologies
IT 406 (C) – Programming with Python
IT 406 (D) – Internet of Things

Elective-IV Lab
IT 453 (A) – Open Source Systems Lab
IT 453 (B) – .Net Technologies Lab
IT 453 (C) – Programming with Python Lab
IT 453 (D) – Internet of Things Lab

***Subjects, which are offered in both I & II Semesters:**
IT/CS 405 : Interactive Computer Graphics
IT 406/A,B,C,D : Elective-IV
IT 409/A,B,C,D : Elective-V
IT 410/A,B,C,D : Elective-VI

IV YEAR (II SEMESTER):

Code No.	Subject Name	Scheme of Instruction periods per week		Scheme of Examination				Category Code
		Theory + Tutorial	Practi-cal's	Duration of Sem End Exam.(hrs)	Sessi-onal Marks	Semester End Exam. Marks	Credits	
IT/CS 407	Industrial Engineering & Management	4	-	3	40	60	3	HS
IT 408	Distributed & Cloud Computing	4+1	-	3	40	60	3	PC
IT 409 *	Elective-V	4	-	3	40	60	3	PE
IT 410 *	Elective-VI	4	-	3	40	60	3	PE
IT 454	Distributed & Cloud Computing Lab	-	3	3	40	60	2	PC
IT 455	Project Work	-	9	-	40	60	10	PC
	Total	17	12		240	360	24	

Elective-V

IT/CS 409 (A) Parallel Algorithms
IT/CS 409 (B) Digital Image Processing
IT 409 (C) Natural Language Processing
IT 409 (D) Cyber Security

Elective-VI

IT/CS 410 (A) – Machine Learning
IT/CS 410 (B) – Semantic Web
IT 410 (C) – Big Data Analytics
IT 410 (D) – Industry Related Subject

***Subjects, which are offered in both I & II Semesters:**

IT/CS 405 : Interactive Computer Graphics
IT 406/A,B,C,D : Elective-IV
IT 409/A,B,C,D : Elective-V
IT 410/A,B,C,D : Elective-VI

I YEAR

IT/CS 101 DIFFERENTIAL EQUATIONS & TRANSFORMS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To provide knowledge on solving ordinary differential equations.
- To provide knowledge on solving higher order ordinary differential equations.
- Focused in partial differential equations.
- To provide knowledge on Fourier transforms.
- To make the student to learn Laplace and inverse transforms of a function.

Course Outcomes

At the end of the course, students will be able to

- know methods of solving first order differential equations.
- solve higher order differential equations.
- solve partial differential equations.
- find Fourier transforms.
- find Laplace and inverse transforms of a function.

UNIT – I (12 Periods)

Differential Equations of First Order: Definition-Formation of differential equation-Equations of first order and first degree: Linear equations, Bernoulli's equation.

Exact differential equations - Equations reducible to exact equations.

UNIT – II (12 Periods)

Linear Differential Equations: Definitions–Operator D–Rules for finding the complementary function–Inverse operator–Rules for finding Particular Integral–working procedure.

Method of variation of parameters–Equations reducible to linear equations with constant coefficients: Cauchy's and Legendre's Linear equations.

UNIT - III **(12 Periods)**

Partial Differential Equations: Formation - Equations solvable by direct integration-Linear equations of first order- Lagrange's linear equation.

Linear Homogeneous partial differential equations of higher order with constant coefficients.

UNIT - IV **(12 Periods)**

Laplace Transforms: Introduction-Transforms of elementary functions – Properties of Laplace transforms – Transforms of derivatives and integrals – Multiplication by t^n and division by t – Evaluation of integrals by Laplace transforms.

Inverse transforms – Convolution theorem (without proof).

UNIT - V **(12 Periods)**

Fourier Transforms: Introduction-Fourier integral theorem (without proof)-Fourier sine and cosine integrals-Complex form of Fourier integral-Fourier transform-Fourier Sine and Cosine transforms.

Properties of Fourier transform (without proofs)-Linear-Change of scale-Shifting Convolution theorem (without proof) - Parseval's identity for Fourier transforms.

Learning Resources:

Text Book:

1. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.

Reference Book:

1. Advanced Engineering Mathematics by Erwin Kreyszig.

IT/CE/ChE/CS/EC/EE/ME 102 ENGINEERING PHYSICS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To prepare students with basic concepts of Physics in a broader sense with a view to lay foundation for the various engineering courses.
- Evaluates how major advances in scientific understanding and technology have changed the direction or nature of scientific thinking.

Course Outcomes

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

- know the Concepts of Ultrasonic waves, production, applications in NDT, Physical optics, devices and applications.
- acquire Knowledge on latest inventions like lasers, holography, fibers and their applications.
- introduce the student to the domain of quantum world by Schrodinger wave equation and its applications in 1-D
- describe the nature of electromagnetic radiation and matter in terms of the particles.

UNIT - I **(12 Periods)**

Ultrasonics: properties, production of ultrasonics by magnetostriction, piezo electric oscillator methods, detection by acoustic grating method, General applications of ultrasonics in industry and medicine.

NDT: Pulse echo testing methods (reflection & transmission modes), Ultrasonic imaging (A Scan & B scan).

UNIT - II **(12 Periods)**

Physical Optics: Interference: Introduction,Stoke's principle (change of phase on reflection), interference in thin films due to reflected light (Cosine law), theory of air wedge (fringes produced by a wedge shaped thin film), theory of Newton's rings(reflected system).

Diffraction: Introduction, Fraunhofer diffraction due to a single slit (quantitative), theory of plane transmission diffraction grating.

Polarization: Introduction, double refraction, construction and working of a nicol prism, quarter wave plate, production and detection of circular and elliptical polarizations (qualitative).

UNIT - III **(12 Periods)**

Lasers: characteristics, spontaneous and stimulated emissions, Einstein coefficients and Relation between them, population inversion, pumping, active system, gas (He-Ne) laser, Nd: YAG laser and semiconductor (GaAs) laser, applications of lasers.

Holography: basic principle, recording, reproduction and applications.

Fiber optics: Principle & structure of an optical fiber, numerical aperture, acceptance angle and acceptance cone, fractional index change, types of optical fibers, fiber optics in communication system and its advantages. Applications of optical fibers.

UNIT - IV **(12 Periods)**

Principles of Quantum Mechanics: de Broglie's concept of matter waves, Davisson and Germer experiment, Heisenberg's uncertainty principle-experimental verification (electron diffraction - single slit).

Schrodinger equation and application: Time independent Schrodinger's wave equation, physical significance of the wave function, particle in a box (one dimensional), tunneling effect, expression for transition probability (Qualitative treatment).

UNIT - V **(12 Periods)**

Electromagnetism: induced electric fields, displacement current and conduction current, Maxwell's equation – qualitative (differential & integral forms)-significance, velocity of electromagnetic wave equation in free space, Poynting Theorem, LC oscillations (quantitative)

Learning Resources:

Text Books:

1. Engineering Physics – M.N. Avadhanulu & P.G. Kshirasagar, S.Chand & Co.Ltd.
2. Engineering Physics- V. Rajendran, Tata MacGraw Hill, New Delhi.

Reference Books:

1. Fundamentals of Physics – Resnick & Halliday, John Wiley sons.
2. Engineering Physics – SL Kakani & Shubhra kakani (3rd Edition), CBS Publications Pvt. Ltd. Delhi.
3. Engineering Physics – B. K. Pandey & S. Chaturvedi, Cengage Learning India Pvt. Ltd., Delhi.
4. Engineering Physics – Hitendra K. Malik & A.K.Singh, Tata McGraw Hill, New Delhi.
5. Engineering Physics – P.K.Palanisamy, Scitech Publications.

IT/CE/CS/EC/EE/ME 103 Applied Chemistry

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To know the softening methods and quality parameters of water used in industries.
- To know the requirements and purification methods of drinking water.
- To understand the construction and functioning of electrochemical energy systems.
- To study the mechanisms, types, factors influencing corrosion and protection methods of corrosion.
- To acquire knowledge on latest analytical techniques.

Course Outcomes

- Students acquire knowledge on quality and utility of water in industries.
- Students gain knowledge on water treatment for drinking purpose.
- Able to understand functioning of electrochemical energy systems.
- Students can relate corrosion and environment and suggest methods to prevent corrosion.
- Can analyze substances using techniques like Spectrophotometry, Colorimetry, Conductometry and Potentiometry.

UNIT - I **(12 Periods)**

Water Technology: Types of Hardness- units and determination by EDTA method (simple problems),Water technology for industrial purpose: Boiler troubles- scales, sludges, caustic Embrittlement, boiler corrosion, priming and foaming- causes and prevention.

Internal conditioning-phosphate, calgon and carbonate treatment. External conditioning-lime soda process (simple

problems), softening by ion exchange process. Desalination of brackish water by electro dialysis and reverse osmosis**.**

UNIT - II (12 Periods)

Water treatment for drinking purpose- WHO guidelines, sedimentation, coagulation, filtration (slow sand filter), various methods of chlorination, breakpoint chlorination.

Phase Rule: Statement and explanation of the terms involved, one component water system, condensed phase rule-construction of phase diagram by thermal analysis, simple eutectic system (Pb-Ag system only), applications eutectic compounds.

UNIT - III (12 Periods)

Electrochemistry: Electrode potential, electrochemical series and its significance, Nernst equation-derivation-related problems, Reference electrodes (SHE and Calomel electrode) Ion-selective electrode-glass electrode and measurement of pH.

Electrochemical Energy Systems: Types of electrochemical energy systems, electrochemistry of primary batteries (Lachlanche or dry cell), Secondary cells (Lead Acid cell, Ni-Cd cell), Lithium batteries (Li-MnO_2, Lithium organic electrolyte) and their advantages. Fuel cells (Oxygen-Hydrogen).

UNIT - IV (12 Periods)

Corrosion and its control: Introduction, dry corrosion, electrochemical theory of corrosion, Types of corrosion-differential aeration, galvanic (galvanic series) and Stress corrosion Factors affecting corrosion-design, pH, over voltage and temperature.

Protection methods: Cathodic protection, (Impressed current and sacrificial anode) corrosion inhibitors- types and mechanism of inhibition, metallic coatings-Galvanization, Tinning, Electroplating (Cu) and electro less plating (Ni).

UNIT - V **(12 Periods)**

Analytical Techniques: Spectroscopy- Beer-Lambert's law, UV-electronic transitions-chromophores-auxochromes-shifts, and IR- modes of vibrations, ex.H_2O, CO_2 Instrumentation of UV and IR.

Colorimetry - estimation of Iron, Conductometric (HCl vs NaOH) and potentiometric titrations (Fe(II)vs $K_2Cr_2O_7$).

Learning Resources:

Text Books recommended:

- Engineering Chemistry, P.C. Jain and Monika Jain, 15th Edition, 2008, Dhanpat Rai Publishing Company, New Delhi (Unit I to Unit V).
- A Text Book of Engineering Chemistry, Shashi Chawla, 3rd Edition, 2009, Dhanpat Rai and Co.(P) Ltd., New Delhi(Unit V).

Reference books:

- A Text Book of Engineering Chemistry, S.S. Dara and S.S. Umare, 12th Edition, 2010, S.Chand and Co.Ltd.

Web references:

http://www.powerstream.com/BatteryFAQ.html#lec

http://freevideolectures.com/Course/3029/Modern-Instrumental-Methods-of-Analysis

http://www.cdeep.iitb.ac.in/webpage_data/nptel/Core%20Science/Engineering%20Chemistry%201/

IT/CE/ChE/CS/EC/EE/ME 104 ENVIRONMENTAL STUDIES

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To give a comprehensive insight into natural resources, ecosystems and bio diversity.
- To create an awareness on various aspects of environmental pollution and effects.
- To educate the ways and means to protect the environment from pollution.
- To impart fundamental knowledge on human welfare and environmental acts.
- To demonstrate the environmental problems like global warming, ozone layer depletion, acid rains.

Course Outcomes

At the end of the course, students will be able to

- define and explain the basic issues concerning the ability of the human community to interact in a sustainable way with the environment.
- describe and discuss the environmental implications of biologically important materials through the ecosystems.
- discuss the benefits of sustaining each of the following resources - food, health, habitats, energy, water, air, soil and minerals.
- know the causes, effects and controlling measures of different types of environmental pollutions with some case studies.

- know the global issues like Global warming, Acid rains, Climate change, depletion of resources etc. and develop suitable technologies for the welfare of mankind.

UNIT - I **(12 Periods)**

Introduction: Definition, Multidisciplinary nature, Scope and Importance of environmental studies

Natural Resources

Forest Resources: Use and over-exploitation, Deforestation, Effects of Mining and Big dams on forests and tribal people. Water Resources: Use and over-utilization of surface and groundwater, floods and droughts, Water logging and salinity; Conflicts over water.

Energy resources: Renewable and non-renewable Energy sources; Land as a resource, land degradation, Soil erosion & Desertification.

UNIT - II **(12 Periods)**

Ecosystems: Definition, Structure and functions of Ecosystems, a general account of types of ecosystems with examples. Bio-geo chemical cycles (water, carbon, and nitrogen).

Biodiversity and its Conservation:

Definition of Biodiversity, Values and threats to biodiversity and conservation of biodiversity. Bio-geographical classification of India, India as a mega-diversity nation, Hot-spots of biodiversity, IUCN classification of Biodiversity, Endemic, Exotic and Endangered species – Meaning with a few examples from India.

UNIT - III **(12 Periods)**

Environmental Pollution: Causes, effects and control measures of Air pollution including Noise, Fresh Water pollution, Marine pollution, Thermal pollution, and nuclear pollution. Solid wastes – Types based on source (Ex. Municipal, industrial, constructional and medical) and nature (degradable and non-degradable); Effects of improper dumping. Solid waste management – Objectives, practices.

Water shed and its management: Definition and importance Water shed management methods including rain water harvestment.

UNIT - IV **(12 Periods)**

Social Issues and Environment: Definition of sustainable development, key types and measures for sustainable development; salient features of Stockholm conference 1972, Earth summit, 1992; Human Population and environment, Green revolution, Resettlement and rehabilitation of people - problems and concerns.

Climate Changes: Green House Gases, Kyoto Protocol, Global warming (The story of Tuvalu); Ozone depletion and Acid rain; Environmental Impact Assessment.

UNIT - V **(12 Periods)**

Environmental acts: Environmental Legislation;Wild life protection act, 1972; Water (Prevention and Control of pollution) act, 1974; Forest Conservation act, 1980; Air (Prevention and Control of pollution) act, 1981; Environmental protection act, 1986.

Case Studies: Chipko movement, Narmada Bachao Andolan, Silent Valley Project, Chernobyl Nuclear Disaster, Bhopal Tragedy, Ralegaon Siddhi, The story of Ganga.

Field work:

Visit to a local area to document environmental assets - river/ forest/grassland / hill /mountain.

Study of local environment-common plants, insects, birds.

Study of simple ecosystems - pond, river, hill, slopes etc.

Visits to industries, water treatment plants, and effluent treatment plants.

Learning Resources:

Text Books:

1. Environmental studies by Anubha Kaushik and C.P.Kaushik., New Age International Publishers, New Delhi., 3rd Edition, 2012.
2. Environmental studies from crisis to cure by R. Rajagopalan. Oxford University press, Chennai, 3rd Edition, 2012.

IT/CE/CS/EE/ME 105 PROBLEM SOLVING WITH C

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand the

- basic problem solving process using Flow Charts and algorithms.
- basic concepts of control structures in C.
- concepts of arrays, functions, pointers and Dynamic memory allocation in C.
- concepts of structures, unions, files and command line arguments in C.

Course Outcomes

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

- develop algorithms and flow charts for simple problems.
- use suitable control structures for developing code in C.
- design modular programs using the concepts of functions and arrays.
- design well-structured programs using the concepts of structures and pointers.
- develop code for complex applications using file handling features.

UNIT - I **(12 Periods)**

Introduction: Computer & it's Components, Hardware , Software, programming languages, Algorithm, Characteristics of algorithm, Flowchart, Symbols used in flowchart, history of C, structure of C program, C language features.

C Tokens: Character set, Identifiers, Keywords, constants, Data types, type qualifiers, Declaration and Initialization of variables.

Operators & Expressions: C operators and expressions, Type-conversion methods, Operators Precedence and Associativity, Input/ Output functions and other library functions.

Programming Exercises: C-Expressions for algebraic expressions, Evaluation of arithmetic and Boolean expressions. Values of variables at the end of execution of a program fragment, Computation of values using scientific and engineering formulae.

UNIT - II **(12 Periods)**

Control Statements: If-Else statement, Else-If statement, Switch statement and goto statement, Looping- While, Do-While and for statements, Break and continue statements.

Programming Exercises: Finding the largest of three given numbers, Computation of discount on different types of products with different ranges of discount, finding the type of triangle formed by the given sides, Computation of income-tax, Computation of Electricity bill, finding roots of a quadratic equation. Finding the factorial of a given number, test whether a given number is-prime, perfect, palindrome or not, Generation of prime and Fibonacci numbers.

UNIT - III **(12 Periods)**

Arrays: One - dimensional, Two-dimensional numeric and character arrays.

Functions: Function Definition, Function prototype, types of User Defined Functions, Function calling mechanisms, Built-in string handling and character handling functions, recursion, Storage Classes, multi-file compilation, Function with Arrays.

Programming Exercises: Computation of statistical parameters of a list of numbers, sorting and searching a given list of numbers, Operations on Matrices such as addition, multiplication, Transpose of a matrix. Finding whether a given

string is palindrome or not, sorting of names, operations on strings with and without using library functions, recursive functions to find the factorial value, Fibonacci series, GCD, swapping of two variables, calling the function by passing arrays.

UNIT - IV **(12 Periods)**

Pointers: Pointer, Accessing a variable through pointer, pointer Arithmetic, pointer and Arrays,Dynamic memory allocation, pointer to pointer, Array of pointers.

Structures: Structures, Nested structures, Array of structures, Pointer to structures, passing structures to functions, self referential structure, Unions.

Programming Exercises: Sort and search the given list using functions and pointers, operations on arrays using functions and pointers. Operations on complex numbers, maintaining the books details by passing array of structures to functions, sorting the list of records.

UNIT - V **(12 Periods)**

Files: defining and opening a file, closing a file, input/output operations on files using file handling functions, random access to files.

Command line arguments, C-preprocessor directives.

Programming Exercises: create and display the contents of text file, copy the contents of one file into another, merging the contents of two files, writing, reading and updating the student records in a file, programs to display the contents of a file and copy the contents of one file into other using command line arguments.

Learning Resources:

Text Book:

1. Programming with C (Schaum's Outlines) by Byron Gottfried, Third Edition, Tata McGraw-Hill.

Reference Books:

1. Programming in C by Stephen G. Kochan, Fourth Edition, Pearson
2. C Complete Reference, Herbert Sheildt, TMH., 2000.
3. Programming with C by K R Venugopal & Sudeep R Prasad, TMH., 1997.
4. The C programming Language by Brian W. Kernighan & Dennis M. Ritchie, Second Edition, Prentice Hall.

Web References:

http://cprogramminglanguage.net/

http://lectures-c.blogspot.com/

http://www.coronadoenterprises.com/tutorials/c/c_intro.htm

http://vfu.bg/en/e-Learning/Computer-Basics--computer_basics2.pdf

IT/CS 106 MECHANICS FOR ENGINEERS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- Study various types of force systems, basic principles of mechanics of rigid bodies and to analyze problems in a simple and logical manner.
- Analyze simple trusses using method of joints.
- Study and determine centroids and centre of gravity of various standard geometrical shapes.
- Learn basic concepts of dry friction on inclined planes and wedges.
- Develop an understanding of rectilinear and curvilinear translation of a particle.
- Study and analyze the rotation of a rigid body about a fixed axis.
- Study the concept of moment of inertia and the mathematical calculations involved in finding moments of inertia of two dimensional areas and material bodies.

Course Outcomes

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

- apply principles of mechanics to determine the resultant of several forces acting on a plane.
- determine the axial forces in the members of simple trusses using method of joints.
- determine the centroids and center of gravity of mathematically definable areas as well as composite areas of standard geometrical shapes.
- analyze the problems involving dry frictional contact and wedge friction

- apply dynamic Equilibrium Equation for rigid bodies under rectilinear and curvilinear translation
- know kinematics and kinetics of rotation of a rigid body about a fixed axis.
- calculate the moment of inertia of composite areas and material bodies of standard shapes.

UNIT - I **(12 Periods)**

Concurrent Forces in a Plane: Principles of statics, composition and resolution of forces, equilibrium of concurrent forces in a plane, method of projections, Method of moments.

Non Concurrent Forces in a Plane: Couple, equilibrium of parallel forces in a plane, resultant and equillibrum of general case of forces in a plane, plane trusses-method of joints.

UNIT – II **(12 Periods)**

Centroid and Centre of Gravity: Concept of centroid and centre of gravity, Centroids of simple figures from basic principles, centroids of composite plane figures.

Friction: Types of friction, laws of friction, simple contact friction, wedge friction**.**

UNIT – III **(12 Periods)**

Moment of Inertia of Plane Figures: Moment of inertia of a plane figure with respect to an axis in its plane, polar moment of inertia, parallel axis theorem, moment of inertia of standard sections by integration, Moment of inertia of composite areas.

UNIT – IV **(12 Periods)**

Rectilinear Motion: Kinematics of rectilinear motion, D'Alemberts principle, work and energy, impulse and momentum, direct central impact.

Curvilinear Motion: Kinematics of curvilinear motion, D'Alembert's principle in curvilinear motion.

UNIT – V **(12 Periods)**

Moment of Inertia of Material Bodies: Moment of inertia of a rigid body, Moment of inertia of a lamina, Moments of inertia of three – dimensional bodies (sphere, right circular cone and cylinder).

Rotation of a Rigid Body about a Fixed Axis: Kinematics of rotation, Equation of motion for a rigid body rotating about a fixed axis.

Learning Resources:

Text Books:

1. Engineering mechanics by S. Timoshenko, D. H. Young, J V Rao and SukumarPati –5th edition, McGraw Hill Education (India) Private Limited, (For concepts).
2. Engineering mechanics-statics and dynamics by A. K. Tayal – 14th edition, Umesh publications (For numerical problems).

Reference Books:

1. Engineering Mechanics by S.S.Bhavikatti, 4th edition, New Age international Publishers.
2. Singer's Engineering Mechanics: Statics and Dynamics, K.Vijaya Kumar Reddy and J Suresh Kumar, 3rd Edition SI Units- BSP Books Pvt.Ltd. Publications.
3. A textbook of Engineering mechanics statics and dynamics by J. L. Meriam and L. Kraige.

IT 151 PHYSICS LABORATORY

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

- To understand the general, scientific concepts required for technology.

Course Outcomes

- Use CRO, signal generator, spectrometer for making measurements.
- Test the optical components using principles of interference & diffraction.
- Determination of the selectivity parameter in electrical circuits.

(Any 10 out of the following experiments)

1. Interference fringes – measurement of thickness of a foil using wedge method.
2. Newton's rings - measurement of radius of curvature of Plano- convex lens.
3. Lissajous' figures – calibration of an audio oscillator.
4. Photo cell – characteristic curves and determination of stopping potential.
5. Diffraction grating - measurement of wavelengths.
6. Torsional pendulum – determination of Rigidity modulus of a wire.
7. Photo-Voltaic cell – determination of fill factor.
8. Series LCR resonance circuit –determination of Q factor.

9. Sonometer – determination of A.C. frequency.
10. Laser- determination of wave length using diffraction grating.
11. Variation of magnetic field along the axis of a circular current carrying coil.
12. Optical Fiber – Determination of Numerical Aperture and Acceptance Angle

Reference Book: Lab Manual

IT 152 C-PROGRAMMING LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course, the student will understand the

- fundamentals of C and working with ANSI C/Turbo C compilers.
- basic concepts of control structures in C.
- concepts of arrays, functions, pointers and Dynamic memory allocation in C.
- concepts of structures, unions, files and command line arguments in C.

Course Outcomes

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

- write simple programs using C fundamentals and control statements.
- develop various menu driven programs using concepts of control statements, arrays, functions and pointers.
- use dynamic memory allocation for efficient memory management.
- develop well-structured programs using the concepts of structures, unions and file handling features.
- design applications using C.

LAB CYCLE:

1. A program for electricity bill taking different categories of users, different slabs in each category. (Using nested if else statement or Switch statement).

Domestic level consumption as follows	
Consumption units	Rate of charges(Rs.)
0-200	0.50 per unit
201-400	100 plus 0.65 per unit
401-600	230 plus 0.80 per unit
601 and above	390 plus 1.00 per unit
Street level consumption as follows	
Consumption units	Rate of charges(Rs.)
0-100	0.50 per unit
101-200	50 plus 0.60 per unit
201-300	100 plus 0.70 per unit
301 and above	200 plus 1.00 per unit

2. Write a C program to evaluate the following (using loops):
   a) $x-x^3/3!+x^5/5!-x^7/7!+$----------up to n terms
   b) $1+x+x^2/2!+x^3/3!+$----------up to n terms
   c) $1-x^2/2!+x^4/4!-x^6/6!+$----------up to n terms
3. A menu driven program to test whether a given number is (using Loops):
   a) Prime or not b) Perfect or not
   c) Armstrong or not d) Strong or not
   e) Palindrome or not
4. A menu driven program to display statistical parameters (using one - dimensional array)
   a) Mean b) Median
   c) Mode d) Standard deviation
5. A menu driven program to perform the following operations in a list (using one -Dimensional array)
   a) Insertion of an element
   b) Deletion of an element
   c) Remove duplicates form the list
   d) Print the list

6. A menu driven program with options (using two dimensional arrays)
   a) To compute A+B
   b) To compute A x B
   c) To find transpose of matrix A.
   Where A and B are matrices.
7. Write C programs to perform the following using Strings
   a) To test the given string is palindrome or not
   b) To sort strings in alphabetical order
8. Write C programs using recursive functions
   a) To find the Factorial value
   b) To generate Fibonacci series
   c) To find the GCD of two given numbers
9. A menu driven program with options (using dynamic memory allocation)
   a) Linear search
   b) Binary search
10. A menu driven program with options (using Character array of pointers)
    a) To insert a student name
    b) To delete a name
    c) To sort names in alphabetical order
    d) To print list of names
11. Write a program to perform the following operations on Complex numbers (using Structures & pointers):
    a) Read a Complex number
    b) Addition, subtraction and multiplication of two complex numbers
    c) Display a Complex number
12. Write C programs to perform the following operations on files
    a) merging the contents of two files
    b) writing, reading and updating student records in a file
    c) Copy the contents of one file into another using command line arguments

IT 153 COMMUNICATION SKILLS LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

- To acquaint the students with the standard English pronunciation, i.e., Received Pronunciation(RP), with the knowledge of stress and intonation.
- To develop the art of effective reading and answer comprehension passages.
- To enable the students use phrasal verbs and idiomatic expressions in an apt manner.
- To equip with appropriate and spontaneous speech dynamics.
- To develop production and process of language useful for social and professional life.

Course Outcomes

At the end of the course, the students will be able to

- know the IPA phonetics symbols, and their relation to pronunciation; recognize the difference among the native, regional and neutral accent of English.
- employ different skills, inferring lexical and contextual meaning and attempt comprehension passages.
- use confidently phrases and idioms for effective communication.
- develop appropriate speech dynamics in professional situations.
- focus on communication skills and social graces necessary for effective communication.

I. Phonetics

Sounds, Symbols, Stress and Intonation.

Pronunciation – Mother tongue influence – Indianisms etc.

II. Reading Comprehension

Strategies, Reading skills – Skimming and Scanning,

Intensive and Extensive reading.

III. Idioms & Phrases

Idioms of variety.

IV. Interactive classroom activities.

Jam– (Guided & Free) – Extempore –Elocution – Telephonic Skills.

Articulation and flow of oral presentation – voice modulation – content generation – Key Word Approach(KWA).

V. Communication Skills

Greeting and Introducing; Making Requests; Agreeing and disagreeing; Asking for and giving permissions; Offering help; Art of small talk; making a short formal speech; Describing people, places, events & things.

Learning Resources:

Textbooks:

1. A Course in Listening & Speaking II, Foundation books by G. Raja Gopal, 2012. (Unit – I) & (Unit-IV).
2. Books on GRE, IELTS & TOEFEL (Unit –II).
3. English Idioms by Jennifer Seidl W. Mc Mordie, OUP, V Edition , 2009.
4. Interactive classroom activities. (10 titles -CUP) (Unit-IV).

5. A course in English Communication – by Kiranmai Dutt, Rajeevan, C.L.N Prakash, 2013. (Unit -V).
6. Better English Pronunciation - J.D.O' Connor, Second Edition, 2009, Cambridge Semester Press. (Unit-I).

Software:

1. Pronunciation power I & II
2. Author plus - Clarity.
3. Call Centre Communication - Clarity.

IT/CS 107 MATRIX ALGEBRA & NUMERICAL ANALYSIS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To Find the Eigen values and Eigen vectors and inverse of a matrix and getting familiarity with diagonalization and quadratic forms.
- To give basic knowledge on evaluation of double, triple integrals, area and volume.
- To provide sufficient theoretical and analytical background of differentiation and integration of vector functions.
- To provide basic knowledge of numerical methods including solving systems of linear equations.
- To provide knowledge on numerical differentiation and integration.

Course outcomes

At the end of the course, students will be able to

- know the basic linear algebraic concepts.
- evaluate double, triple integrals and the area, volume by double & triple integrals respectively.
- solve gradient, divergence, curl and integration of vector function problems.
- solve system of equations.
- evaluate derivatives and integrals using numerical techniques.

UNIT - I **(12 Periods)**

Matrices: Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values (without proofs) – Cayley – Hamilton theorem (without proof).

Reduction to diagonal form.Reduction of quadratic form to canonical form by orthogonal transformations, Nature of a quadratic form.

UNIT - II **(12 Periods)**

Multiple Integrals: Double integration in Cartesian and polar coordinates – Change of order of integration – Area as a double integral.

Triple integration in Cartesian coordinates – Change of variables in double integrals from Cartesian to polar – Volume as a Triple Integral.

UNIT - III **(12 Periods)**

Vector Calculus: Gradient, Directional derivatives, divergence, curl – Solenoidal and irrotational fields – Vector identities (without proof).

Line, surface and volume integrals – Green's theorem in the plane, Stoke's theorem and Gauss divergence theorem (without proofs).

UNIT - IV **(12 Periods)**

Numerical Solution of Equations and Interpolation : Newton - Raphson method – Gauss Seidel method. Forward and backward differences – Differences of a polynomial.

Interpolation – Newton-Gregory Forward and Backward Interpolation formulae (without proof), Lagrange's Interpolation formula (without proof) – Inverse interpolation.

UNIT - V **(12 Periods)**

Numerical differentiation and Integration: Newton's forward and backward differences formulae to compute first and second order derivatives.

Trapezoidal rule – Simpson's one third rule.

Learning Resources:

Text Book:

1. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.

Reference Book:

1. Advanced Engineering Mathematics by Erwin Kreyszig.

IT/CS/EC/EE 108

ELECTRONIC AND ELECTRICAL ENGINEERING MATERIALS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- the concept of electron motion in a periodic potential, classification of solids through bands, and the intrinsic & extrinsic semiconductors and their carrier densities.
- energy level diagrams in in PN junction, its characteristic equation and the related optoelectronic devices.
- basics of Dielectrics and magnetism, Classification of materials on Polarization and Magnetization and applications.
- properties and applications of super conductors
- nano materials and characterization with X-rays and electron probe techniques.

Course Outcomes

At the end of the course, students will be able to

- know the nature of formation of bands in solid and classifying the solids, Importance of Fermi level and law of mass action in semiconductors.
- know the theory of P-N junction and the devices based on it.
- know the importance of polarization and magnetization phenomena and their applications
- know the relevance of superconductivity and its applications
- know nano material and their characterization principles

UNIT - I **(12 Periods)**

Electron theory of solids: Failures of Classical free electron theory and quantum free electron theory (qualitative), Bloch theorem (Qualitative), Kronig-Penney model (Qualitative treatment), effective mass of electron, energy band formation in solids, Classification of solids into metals, semiconductors and insulators.

Semiconductor Physics: Intrinsic & extrinsic semiconductors, density of states, derivation for intrinsic & extrinsic carrier concentration (P Type & N-type), location of Fermi level, Hall effect and its uses, direct & indirect band gap semiconductors, donor and acceptor energy levels, charge neutrality, law of mass action.

UNIT - II **(12 Periods)**

Physics of Semiconductor materials: Drift and Diffusion current, Continuity equation Formation of P-N junction, energy level diagram and built in potential, I-V Characteristics of P-N junction diode, Photodiode, LED, LCD, solar cell (qualitative).

UNIT - III **(12 Periods)**

Magnetic Materials: Introduction, origin of magnetic moment, Langevin's theory of paramagnetism, weiss theory of ferromagnetism, hysteresis curve, soft and hard magnetic materials, Ferrites and their applications.

Dielectric Materials: Fundamental definitions: Electric dipole moment, polarization vector, polarizability, electric displacement, dielectric constant and electric susceptibility. Types of polarizations - Electric and ionic polarisations, internal fields in solids (Lorentz method), Clausius-Mossotti equation, Frequency dependence of polarization, loss tangent, and dielectric loss, Ferroelectrics and their applications.

UNIT - IV **(12 Periods)**

Superconducting materials: Introduction, critical parameters (T_c, H_c, I_c), Meissner effect, types of superconductors, entropy, specific heat, energy gap, BCS Theory(in brief), Josephson effect, London equation and penetration depth, high temperature superconductors, applications of superconductors.

UNIT - V **(12 Periods)**

Nanomaterials : Introduction to nano materials, surface to volume ratio, General properties of nano materials in brief, fabrication of nano materials (sol-gel and chemical vapour deposition methods), applications of nano materials.

Characterization techniques: XRD**,** SEM, STEM, AFM.

Learning Resources:

Text Books:

1. Materials Science – V. Rajendran, McGraw Hill Education (India) Pvt. Lt., NewDelhi (2014).
2. Engineering Physics – M.N. Avadhanulu & P.G. Kshirasagar, S.Chand & Co.Ltd.

Reference Books:

1. Materials science – M. Vijaya and G. Rangarajan, McGraw Hill Education (India) Pvt. Lt., NewDelhi (2014).
2. Solid State physics – S.O. Pillai .
3. Solid state physics and Electronics – R.K.Puri and V.K.Bubber .

IT/CE/CS/EC/EE/ME 109

CHEMISTRY FOR ENGINEERING MATERIALS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To acquire knowledge on formation of polymers and conditions to act as conducting polymers.
- To gain knowledge on the chemistry of some important plastics and rubbers commonly used.
- To understand parameters related to efficiency of various fuels
- To gain knowledge on the characteristics of refractories and lubricants.
- To understand the requirements and chemistry of explosives and utility of liquid crystals.

Course Outcomes

- Students know the formation of polymers and the utility of conducting polymers in electronics, electrical and other fields.
- Students would be able to know usage of plastics and elastomers in day-to-day life and in fields like automobile, electronics, etc.
- Would acquire knowledge on composition, quality and uses of various fuels.
- Would be capable of selecting appropriate lubricant for a given system, and know the characteristics and utility of refractories.
- Students acquire knowledge on the requirements, applications of liquid crystals and explosives.

UNIT - I **(12 Periods)**

Polymer: Monomer functionality, degree of polymerization, Tacticity, classification of polymerization- addition, condensation and co-polymerization, mechanism of free radical polymerization.

Conducting polymers: Introduction, examples and applications, Polyacetylene- mechanism of conduction.

UNIT - II **(12 Periods)**

Plastics: Thermoplastic and thermosetting resins, preparation, properties and uses of Bakelite, polyesters, Teflon and PVC. Compounding of plastics.

Rubber: Processing of latex, Drawbacks of natural rubber-Vulcanization, Chemistry of Synthetic rubbers- Buna-S and Buna-N, polyurethane rubber and silicone rubber, epoxy resin (adhesive).

UNIT - III **(12 Periods)**

Fuels: Classification of fuels, calorific value- LCV and HCV-units and determination by Bomb calorimeter, Coal- Ranking, proximate and ultimate analysis, carbonization of coal-types (using Beehive oven), Metallurgical coke-properties and uses.

Petroleum based: Fractional distillation, cracking-fixed bed, reforming, octane number and cetane number of liquid fuels, composition and uses of petrol, diesel**,** CNG and LPG.

UNIT - IV **(12 Periods)**

Refractories: Characteristics, classification, properties and their significance–refractoriness, strength of refractoriness under load, dimensional stability, thermal spalling, thermal expansion, thermal conductivity, porosity Common refractory bricks- silica, fire clay and carborundum.

Lubricants: Classification, functions, properties of lubricants- Viscosity, Viscosity index, Flash point, Fire point, Cloud point, Pour point, Oilyness. Solid lubricants –Graphite and Molybdenum sulphide, Additives, determination of viscosity by Red wood viscometer.

UNIT - V **(12 Periods)**

Liquid crystals: Structure of liquid crystal forming compounds, Classification and applications.

Explosives: Characteristics, terms related to explosives, classification-primary, low and high explosives. Manufacture of gun powder, lead azide, nitroglycerine and RDX.

Learning Resources:

Text books:

1. Engineering Chemistry, P.C. Jain and Monika Jain, 15th Edition, 2008, Dhanpat Rai Publishing Company, New Delhi (UNIT-I to UNIT-V).
2. A Text Book of Engineering Chemistry, Shashi Chawla, 3rd Edition, 2009, Dhanpat Rai and Co.(P) Ltd., New Delhi (UNIT-I & UNIT-IV).

Reference books:

1. A Text Book of Engineering Chemistry, S.S. Dara and S.S. Umare, 12th Edition, 2010, S.Chand and Co.Ltd.
2. Principles of Polymer Science, P.Bahadur and N.V. Sastry, Narora Publishing House

Web References:

http://www.chem1.com/acad/webtext/states/polymers.html
http://www.nptel.ac.in/courses/104105039/
http://freevideolectures.com/Course/3070/Science-and-Technology-of-Polymers

IT/CE/ChE/CS/EC/EE/ME 110

ENGLISH FOR COMMUNICATION

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To enable students improve their lexical and communicative competence.
- To equip students with oral and written communication skills.
- To help students understand and learn the correct usage and application of Grammar principles.
- To get them acquainted with the features of successful professional communication.
- To enable students acquire various specific features of effective written communication.

Course Outcomes

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

- use vocabulary contextually.
- compose effectively the various forms of professional communication.
- apply grammar rules efficiently in spoken and written forms.
- understandand overcome the barriers in communication.
- develop professional writing.

UNIT - I **(12 Periods)**

Lexis:

a. i. Synonyms & Antonyms
   ii. Words often confused.
b. i. One Word Substitutes
   ii. Analogies

UNIT - II **(12 Periods)**

Written Communication:

a) Note-taking & Note-making
b) Writing a Proposal
c) Memo Writing
d) Paragraph writing

UNIT - III **(12 Periods)**

Principles of Grammar:

Exposure to basics of grammar with emphasis on

a) Articles & Prepositions
b) Tenses
c) Voice
d) Speech

UNIT - IV **(12 Periods)**

Communication:

Forms of communication – Barriers to communication – Non-verbal Communication - Kinesics, Proxemics, Occulesics, Haptics

UNIT - V **(12 Periods)**

Composition:

a) E-mail
b) Letter-writing: order, complaint, job application, invitation.
c) Precis writing
d) Biographical writing:
    1. APJ Abdul Kalam
    2. Ratan Tata
    3. Sudha Murthy
    4. Mother Teresa

Learning Resources:

Text Book:

1. Technical English - by Dr. M.Sambaiah, Wiley India Pvt. Ltd, New Delhi 2014.
2. Communication Skils – OUP, by Sanjay Kumar & Pushpa Latha (This text is prescribed for the topics: (1) One word Substitutes (2) Note-taking and (3) Haptics)

References:

1. Dictionary of Synonyms and Antonyms, Oxford & IBH, III Ed
2. Objective English III Edition, Mc-Graw Hill Companies- by Hari Mohan Prasad, Uma Rani Sharma.
3. Technical Communication – Principles & Practice. II Ed, by Meenakshi Raman & Sangeetha Sharma
4. Oxford Michael Swan- Practical English Usage – III Ed . New international Students ' Ed,OUP.
5. Business Communication II Ed. Meenakshi Raman & Prakash Singh,OUP
6. Handouts
7. A course in English Communication – by Kiranmai Dutt, Rajeevan, C.L.N Prakash
8. The Most Common Mistakes in English Usage – Thomas Elliott Berry.

IT/CS 111 OBJECT ORIENTED PROGRAMMING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- Object Oriented Programming features of C++.
- the concepts of encapsulation and compile time polymorphism.
- the concepts inheritance and Runtime polymorphism.
- the concepts of templates and exception handling.
- the disk access through C++ I/O and other advanced concepts.

Course Outcomes

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

- apply basic Object Oriented features of C++.
- apply the concept of encapsulation and compile time polymorphism.
- implement the concepts of Inheritance and Runtime polymorphism.
- implement the concepts of exception handling and Templates.
- develop applications using C++ File I/O and other advanced concepts.

UNIT - I **(15 Periods)**

An Overview of C++: The Origins of C++, What is Object Oriented Programming, some C++ fundamentals, Old-Style Vs Modern C++, Introducing C++ Classes, Function Overloading, Operator Overloading, Inheritance, Constructors and

Destructors, The C++ Keywords, The General Form of a C++ Program.

Classes and Objects: Classes, Structures and Classes, Unions and Classes are Related, Friend Functions, Friend Classes, Inline Functions, Parameterized Constructors, Static Class Members, When Constructors and Destructors are Executed, Scope Resolution Operator, Nested Classes, Local Classes, Passing and Returning Objects, Object Assignment.

Arrays, Pointers, References and the Dynamic Allocation: Arrays of Objects, Pointers, References, Dynamic Allocation Operators, and the Placement Forms of new and delete.

UNIT - II **(15 Periods)**

Function Overloading, Copy Constructors and Default Arguments: Function Overloading, Overloading Constructor Functions, Copy Constructors, Finding the Address of an Overloaded Function, Overload Anachronism, Default Arguments, Function Overloading and Ambiguity.

Operator Overloading: Creating Member Operator Function, Overloading Using a Friend Function, Overloading new delete, Overloading Special Operators & Comma Operator.

UNIT - III **(15 Periods)**

Inheritance: Base-Class Access Control, Inheritance and protected members, Inheriting Multiple Base Classes, Constructors, Destructors and Inheritance, Granting Access, Virtual Base Classes.

Virtual Functions & Polymorphism: Virtual Functions, The Virtual Attribute is inherited, Virtual Functions are Hierarchical, Pure Virtual Functions, Using Virtual Functions, Early Vs Late Binding.

UNIT - IV **(15 Periods)**

Templates: Generic Functions, Applying Generic Functions, Generic Classes, Typename and export Keywords, Power of Templates.

Exception Handling: Fundamentals, Derived-Class Exceptions, Options, Terminate() and unexpected(), uncaught_exception(), exception and bad_exception Classes, Applying Exception Handling.

The C++ I/O System Basics: Old Vs. Modern C++ I/O, Streams, Stream Classes, Formatted I/O, Overloading << and >>, Creating Manipulators.

UNIT - V **(15 Periods)**

C++ File I/O: File Classes, Opening and Closing a File, Text Files, Unformatted Binary I/O, get(), Getline() functions, Detecting EOF Random Access.

Runtime Type ID and the Casting Operators: RTTI, Casting Operators, Dynamic_cast, Reinterpret_cast.

Namespaces, Conversion Functions and other Advanced Topics: Namespaces, The std Namespace, Creating Conversion Functions, const Member Functions and mutable, Volatile Member Functions, Explicit Constructors, asm Keyword, Linkage Specification, Array-Based I/O, Dynamic Arrays, Binary I/O with Array-Based Streams, Differences between C and C++.

Introducing Standard Template Library: An Overview of STL.

Learning Resources:

Text Book:

1. The Complete Reference - C++ by Herbert Schieldt, 4/e, Tata McGraw Hill.

Reference Books:

1. The C++ Programming Language by Bjarne Stroustrup, Special Edition, Pearson india
2. C++ How to Program – Paul Dietel & Harvey Dietel,8th edition, Pearson education.
3. Object Oriented Programming in C++ by Barkakati and nabajyoti, SAMS,1991.
4. Mastering C++ by K.R.Venugopal & Rajkumar Buyya Tata McGraw Hill 2013.
5. Thinking in C++ , Volume I and II by Bruce Eckel, Pearson india.

IT/CS 112 PROFESSIONAL ETHICS & HUMAN VALUES

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course objectives

At the end of the course , the students will understand

- essential values and skills to ensure happiness and prosperity which are the core aspirations of all human beings.
- the ethical concepts that are relevant to resolving Moral issues in Engineering and to impart reasoning and analytical skills needed to apply ethical concepts to Engineering decisions
- the engineering work environment with well developed reasoning and analytical skills
- the interface between Social, Technological and Natural environments.

Course out comes

At the end of the course, the students will be able to

- comprehend a specific set of behavior and values the professional interpreter must know and must abide by, including confidentiality, honesty and integrity.
- achieve the highest quality, effectiveness and dignity in both the process and products of professional work.
- implement the moral requirements of engineering experiments, and have the ability to apply their knowledge to the solution of practical and useful problems.
- protect the safety, health and welfare of the public interest.
- know and respect existing laws pertaining to professional work.

UNIT - I **(12 Periods)**

Morals, Values and Ethics – Self-Confidence – Character-Valuing Time – Courage - Honesty– Caring – Sharing-Self respect – Respect for Others – Spirituality-Living Peacefully.

Integrity- Commitment – Empathy - Work Ethics - Service Learning – Stress management-Civic Virtue –Co-operation.

UNIT - II **(12 Periods)**

Scope and aims of Engineering Ethics-Senses of 'Engineering Ethics' – Variety of Moral Issues – Types of Inquiry – Engineering Ethics and Philosophy.

Moral Dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory –Criteria for a profession-Multiple Motives-Models of Professional Roles.

UNIT - III **(12 Periods)**

Moral reasoning and Ethical Theories-Virtue Ethics-Utilitarianism-Duty ethics-Right ethics-Self interest, Customs and Religion -Uses of Ethical Theories-Testing of Ethical Theories.

Engineering as experimentation – Similarities to Standard Experiments-Contrasts with Standard Experiments-Engineers as Responsible Experimenters – A Balanced Outlook on Law – Problems with Law in engineering- The Challenger Case Study.

UNIT - IV **(12 Periods)**

Safety and Risk: Assessment of safety and risk – Risk benefit analysis and reducing risk –Testing for safety The Three Mile Island and Chernobyl case studies and safe exit.

Collegiality and loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Occupational crime –– Intellectual property rights (IPR) – Discrimination.

UNIT - V **(12 Periods)**

Professional rights – Employee rights-Whistle blowing-discrimination-Multinational corporations – Environmental ethics – Computer ethics – Weapons development.

Engineers as managers – Consulting engineers – Engineers as expert witnesses and advisors – Moral leadership – codes of ethics-role and limitations of codes-Sample code of ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronic and telecommunication engineers (IETE), India, etc.

Learning Resources:

Text Books:

1. Mkie Martin and Roland Schinzinger, Ethics in Engineering, McGraw – Hill, New Jersey, 2004 (Indian Reprint)
2. Govindarajan M, Natarajan S, Senthil Kumar V.S, Engineering Ethics, Prentice Hall of India, New Delhi, 2004.

Reference Books:

1. Charles D. Fleddermann, Engineering Ethics, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, Engineering Ethics –Concepts and Cases, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint).

IT 154 CHEMISTRY LABORATORY

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

- To learn the concepts of equivalent weight, molecular weight, normality, molarity, weight percent, volume percent.
- To prepare molar solutions of different compounds.
- To know the methods of determining alkalinity, hardness and chloride ion content of water sample.
- To know the methods to determining purity of washing soda, percentage of available chlorine in bleaching powder.
- To learn the redox methods to determine Fe2+ ions present in solution.
- To know principles and methods involved in using instruments like conductivity bridge, spectrophotometer, pH meter and potentiometer.

Course Outcomes

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

- acquire knowledge on normality, molarity, molecular weight, equivalent weight, oxidizing agent, reducing agent.
- prepare solutions with different concentrations.
- analyse water for its hardness, alkalinity, chloride ion content, iron content.
- know the principles behind the development of instruments suitable for chemical analysis. Later he can use the knowledge in modifying instruments.

(Any 10 out of the following experiments)

01. Determination of total alkalinity of water sample
    a. Standardization of HCl solution
    b. Determination of alkalinity of water
02. Determination of purity of washing soda
    a. Standardization of HCl solution
    b. Determination of percentage purity of washing soda
03. Estimation of Chlorides in water sample
    a. Standardization of $AgNO_3$ solution
    b. Estimation of Chlorides in water
04. Determination of Total Hardness of water sample
    a. Standardization of EDTA solution
    b. Determination of Total Hardness of water
05. Estimation of Mohr's salt-Permanganometry
    a. Standardization of $KMnO_4$ solution
    b. Estimation of Mohr's salt
06. Estimation of Mohr's salt –Dichrometry
    a. Standardization of $K_2Cr_2O_7$ solution
    b. Estimation of Mohr's salt
07. Determination of available chlorine in bleaching powder-Iodometry
    a. Standardization of Hypo
    b. Determination of available chlorine in bleaching powder

08. Estimation of Magnesium
    a. Standardization of EDTA solution
    b. Estimation of Magnesium
09. Conductometric titration of an acid vs base
10. Potentiometric titrations: Ferrous vs Dichromate

Demonstration Experiments:

11. pH metric titrations of an acid vs base
12. Spectrophotometry: Estimation of Mn/Fe

IT 155 OBJECT ORIENTED PROGRAMMING LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course, the student will understand

- object Oriented programming features of C++.
- the concepts of encapsulation and compile time polymorphism.
- the concepts inheritance and Runtime polymorphism.
- the concepts of templates and exception handling.
- the disk access through C++ I/O and other advanced concepts.

Course Outcomes

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

- write programs using basic Object Oriented features of C++.
- apply the concept of encapsulation and compile time polymorphism.
- implement the concepts of Inheritance and Runtime polymorphism.
- implement the concepts of exception handling and Templates.
- develop applications using C++ File I/O and other advanced concepts.

LAB CYCLE:

1. Create a class HUGEINT by which we would be able to use much wider range of integers. Perform addition operation on two HUGEINTs.
2. Create a class TIME with appropriate data members to represent TIME. Construct a class implementation section to compare two TIMEs, to increment TIME by one second, to decrement TIME by one second and appropriate constructors to create TIME objects.
3. Write a class declaration for DATE and allow the operations to find nextday(), previousday(), leapyear(), compare() with appropriate constructors and destructors.
4. Create a user defined datatype STRING, allow possible operations by overloading (Relational operators,[], ( ), <<,>>, =).
5. Define RATIONAL class. Allow possible operations on RATIONALs by overloading operators (Arithmetic, Unary operators,<<,>>).
6. a. A program to implement Single inheritance

   b. A program to implement multiple inheritances

   c. A program to implement Hierarchical inheritance

   d. A program to implement Multipath inheritance
7. a. A program to implement runtime polymorphism

   b. A program to implement abstract base class concept.
8. Develop a program to sort elements using function template
9. A program on class template

10. A program to implement Exception Handling
11. Write a program to read STUDENT records and write into file “STUDENT” by defining STUDENT class. Display STUDENTs data in a tabular format by defining appropriate manipulators.
12. a. A program on FILEs.
    b. A program on command line arguments.

IT 156 ENGINEERING GRAPHICS LAB

Lectures	:	2 periods/week	Sessional Marks	:	40
Practicals		4 periods/week	Sem. End Exam Marks	:	60
End Exam Duration	:	3 hours	Credits	:	**2**

Course Objectives

- Comprehend general projection theory with emphasis on orthographic projection to represent three dimensional objects in two dimensional views.
- Construct letters & Numerals in a legible freehand form.
- To be able to plan and prepare neat orthographic drawings of points, Straight lines, Regular planes and solids
- Draw and identify various types of section and Auxiliary views.
- To enable the students the aspects of development of surfaces in sheet metal working
- Introduce Auto CAD software for the creation of basic entities and usage of different tool bars.

Course Outcomes

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

- acquire basic skills in Technical graphic communication.
- visualize and communicate with 2D as well as three dimensional shapes.
- know the application of Industry standards and best practices applied in engineering graphics.
- apply the knowledge of development of surfaces in real life situations.
- familiarize with modern CAD system using Auto CAD.
- draw simple 2D Engineering Drawings using Auto CAD.

(To be taught & examined in First angle projection)

General: Use of Drawing instruments, Lettering-Single stroke letters, Dimensioning- Representation of various type lines, Geometrical Constructions, Representative fraction.

Curves : Curves used in Engineering practice - conic sections – general construction and special methods for ellipse, parabola and hyperbola.

cycloidal curves - cycloid, epicycloid and hypocycloid; involute of circle and Archemedian spiral.

Method of Projections: Principles of projection, First angle and third angle projection of points, Projection of straight lines, Traces of lines.

Projections of Planes: Projections of planes, projections on auxiliary planes.

Projections of Solids: Projections of Cubes, Prisms, Pyramids, Cylinders and Cones with varying positions.

Sections of Solids: Sections of Cubes, Prisms, Pyramids, cylinders and Cones, True shapes of section (Limited to the Section Planes perpendicular to one of the Principal Planes).

Development of Surfaces: Lateral development of cut sections of Cubes, Prisms, Pyramids, Cylinders and Cones.

Isometric Projections: Isometric Projection and conversion ofOrthographic Projections into isometric views. (Treatment is limited tosimple objects only).

Orthographic Projections: Conversion of pictorial views intoOrthographic views. (Treatment is limited to simple castings).

Computer Aided Drafting (Using any standard package)(Demonstration only) :

Setting up a drawing: starting, main menu (New, Open, Save, Save As etc.), Opening screen, error correction onscreen, units, co-ordinate system, limits, grid, snap, ortho.

Tool bars: Draw tool bar, object snap tool bar, modify tool bar, dimension tool Bar

Practice of 2D drawings: Exercises of Orthographic views for simple solids using all commands in various tool bars.

Learning Resources:

Text Book:

1. Engineering Drawing by N.D. Bhatt & V.M. Panchal, Charotar publishing house, 50th Edition, 2010.

Reference Books:

1. Engineering Drawing by Prof. K.L.Narayana & Prof. R.K.Kannaiah, Scitech Publications, 2010.
2. Engineering Graphicswith AutoCAD 2002 by James D. Bethune, PHI, 2011.

Web References:

www.wikipedia.com
NPTEL Lectures

II

YEAR

IT/CS 201
PROBABILITY-STATISTICS & RANDOM PROCESSES

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the students will understand

- the knowledge of a random variable and its prominence in analyzing the data.
- the basic principles of various probability distributions.
- statistical inference and applying it to practical problems.
- the concepts of random, markov and Gaussian processes and their applications.

Course Outcomes

At the end of the course, students will be able to

- apply knowledge of distribution theory to both software and hardware design problems
- apply various distribution models to design and conduct experiments, as well as to analyze and interpret data.
- obtain knowledge to estimate and test different criterion.
- test hypotheses and draw inference for engineering problems.
- know various processes and their application in analyzing the data.

UNIT - I **(12 Periods)**

Probability Distributions: Random variables, binomial distribution, mean and variance of a probability distribution, Poisson approximation to the binomial distribution, Continuous random variables, normal Distribution, normal approximation to the binomial distribution.

Other Probability Densities: exponential distribution, uniform distribution, gamma distribution, beta distribution, Weibull distribution.

UNIT - II **(12 Periods)**

Sampling Distribution: Population and samples, sampling distribution of the mean (σ known), sampling distribution of the mean (σ unknown) , sampling distribution of variance.

Inferences Concerning Means: Point estimation, interval estimation, tests of hypotheses, hypothesis concerning one mean, hypothesis concerning two means.

UNIT - III **(12 Periods)**

Inferences concerning Variances: Estimation of variances, hypotheses concerning one variance, hypotheses concerning two variances.

Inferences Concerning Proportions: Estimation of proportions, hypothesis concerning one proportion, hypothesis concerning several proportions.

UNIT - IV **(12 Periods)**

Random Processes: Classification of Random Processes, Methods of description of a random process, Special classes of random processes, Average values of random processes.

Analytical Representation of Random processes: Auto correlation function and its properties, Cross correlation functions and its properties.

UNIT - V **(12 Periods)**

Gaussian Process: Definition of Gaussian Process, properties, Definition of Poisson Process, Properties, Mean and Auto correlation of the Poisson process.

Markov Process: Definition of a Markov chain, Chapman-Kolmogorov theorem, Classification of states of a Markov chain.

Learning Resources:

Text Books:

1. Probability and Statistics for Engineers , 6th Edition by Richard A. Johnson, (Prentice Hall of India) (UNIT – I to UNIT – III)
2. Probability, Statistics and Random processes by T.Veerarajan, (Tata McGraw- Hill). (UNIT – IV & UNIT – V)

Reference Books:

1. Probability and Statistics for Engineers and Scientists (9th Edition) by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, (9th Edition) ***Prentice Hall, 2011.***

2. Probability and Statistics with Reliability, Queuing, and Computer Science Applications, 2nd Edition, by Kishor S. Trivedi, Wiley 2001.

IT/CS 202
BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To develop an understanding of the fundamental laws and elements of electrical circuits.
- To learn the energy properties of electric elements and the techniques to measure voltage and current.
- To develop the ability to apply circuit analysis to DC and AC circuits.
- To understand the principle of operation and characteristics of Electronic Devices like Diode, transistor.
- To analyze the transistor biasing and Oscillator circuits.

Course Outcomes

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

- know basic elements and laws of electrical circuits.
- analyze electrical circuits using different theorems.
- know about AC single phase and three phase systems.
- know about Various Electronic devices and their operation.
- know about Applications of various electronic devices such as Diode and transistor.

UNIT - I **(12 Periods)**

Introduction to Circuit Elements: charge, Voltage, Current, Power and Energy, Circuit concept, Active and Passive circuit elements, Ideal, Practical and dependent sources and their V-I characteristics, Ohm's Law.

Series Parallel Circuits: Source transformation, Voltage and Current division; V-I characteristics of Passive elements and their series / Parallel combination.

UNIT - II **(13 Periods)**

Response of the Network using different Techniques: Kirchhoff's Voltage law and Kirchhoff's Current law, Mesh and Nodal Analysis, Star - Delta transformation.

Network Theorems: Superposition, Thevenin, Norton, Maximum power, and Application of theorems to DC circuits.

UNIT - III **(13 Periods)**

Alternative Periodic Waveforms: Instantaneous current, voltage and power, peak, effective and average voltage and current, crest factor and form factor, phase difference, J notation and phasor representation,

Introduction to 1-Phase and 3-phase circuits: Response of RLC series and parallel circuits to sinusoidal excitation, Analysis of 3-phase balanced loads only.

UNIT - IV **(11 Periods)**

Semiconductor Diodes: Semiconductor diode, Zener diode, Load line analysis, Half-Wave Rectifier, Full-Wave rectifier, Clippers and Clampers (unbiased only).

Bipolar Junction Transistor: Transistor operation, Common base configuration, Common emitter configuration, Common collector configuration, Operating point, JFET and characteristics of JFET.

UNIT - V **(11 Periods)**

Amplifiers: Need of biasing, Thermal runaway, Types of biasing-fixed bias, collector base bias, self bias.Transistor h-parameter model, Analysis of transistor amplifier using h-parameters.

Feedback and Oscillator Circuits: Feedback concepts, feedback connection types, Barkhausen criteria, Phase-Shift oscillator, Wien bridge oscillator, Hartley oscillator, Colpitt’s oscillator.

Learning Resources:

Text Books:

1. A.Sudhakar and Shyam Mohan SP, Circuits and Networks: Analysis and Synthesis, 5th Edition, TMH, 2015. (UNIT-I to UNIT-III)
2. N.N.Bhargava & D.C.Kulshreshtha, "Basic Electronics", Tata McGrawHill Publishers. (UNIT-IV & UNIT-V)

Reference Books:

1. Mahmood Nahvi and Joseph Edminister, Electric Circuits, 4th Edition, Schaum's outline series, TMH, 2004.
2. S.Salivahanan, A.Vallavaraj, "Electronic Devices and Circuits", Tata McGraw Hill Publishers.

E-Resources:

1. http://nptel.ac.in/courses/117106101/
2. http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-002-circuits-and-electronics-spring-2007/syllabus/
3. http://nptel.ac.in/courses/122106025/

IT/CS 203 DIGITAL LOGIC DESIGN

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To provide the basics concepts used in the Design and analysis of Digital Systems.
- To understand the Boolean algebra concepts and basic Gates.
- To constructs Combinational circuits by using Gates.
- To constructs sequential logic circuits by using Flip Flops.
- To understand about the Memory elements and PLD's.

Course Outcomes

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

- know the basic digital logic fundamentals such as numbering systems, binary codes.
- know the Boolean algebra concepts which are used to describe mathematical relationship between input and output signals.
- design combinational circuits.
- design Sequential logic circuits.
- familiarize with memory elements like RAM, ROM, and PROM.

UNIT - I **(10Periods)**

Digital Systems and Binary Numbers: Digital Systems, Binary Numbers, Number-Base Conversions, Octal and Hexadecimal Number systems and their conversions, complements of Numbers. Codes: BCD, Excess 3, Gray codes.

UNIT - II **(12 Periods)**

Boolean Algebra and Logic Gates: Introduction, Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic theorems and Properties of Boolean Algebra, Boolean functions, Canonical and Standard Forms, Digital Logic gates.

Gate-Level Minimization: Introduction, The Map Method, Four-Variable K-Map,Five-Variable K-Map, Product of sums simplification Don't-Care conditions, NAND and NOR implementations.

UNIT - III **(15Periods)**

Combinational Logic : Introduction, Combinational Circuits, Analysis Procedure, General design procedure, Binary adder-Sub tractor, Decimal Adder, Magnitude comparator, Encoders, Decoders, Multiplexers.

UNIT - IV **(13Periods)**

Synchronous Sequential Logic: Introduction, Sequential Circuits**,**Latches,Flip Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure.

UNIT - V **(15Periods)**

Registers: Register, Left Shift register, Right shift register, Bidirectional Shift register, Universal Shift register.

Counters: Design of Synchronous counters, Ripple counters, Ring counter, Johnson counter.

Memory and Programmable Logic: Read – Only Memory, Programmable logic array (PLA), Programmable array logic (PAL).

Note: Except Verilog HDL

Learning Resources:

Text Book:

1. M Morris Mano – Digital Design With an introduction to the Verilog HDL, 5th Edition, Pearson Education, 2015.

Reference Book:

1. RP Jain, Modern Digital Electronics, 3rd Edition, TMH, 2013.
2. .Anand Kumar ,Fundamentals of Digital Circuits,4th Edition,PHI,2009
3. Thomas L. Floyd, Digital Fundamentals, 10th Edition, Person Education, 2011

IT/CS 204 DATA STRUCTURES

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- time and Space complexity, linked lists ADT's and its applications.
- the ADT's of stacks and queues and its applications.
- searching, sorting and hashing techniques.
- binary trees ADT's and its applications.
- graph representations and traversal methods.

Course Outcomes

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

- determine the time complexities of different algorithms, and implement ADT's of different types of linked lists and applications.
- implement stack and queue ADT's using arrays and linked lists and their applications.
- Implement searching and hashing techniques.
- implement BST ADT and the constructions of Expression tree, AVL tree, and B-Tree.
- implement and analyze different sorting algorithms and Graph traversal methods.

UNIT -I **(15 Periods)**

Algorithm Analysis: Mathematical Back Ground, Model, What to Analyze, Running Time Calculations.

Lists: Abstract Data Types, The List ADT, Singly Linked List ADT, Doubly Linked List ADT, Circular Linked List ADT, Polynomial ADT.

UNIT -II **(15 Periods)**

Stacks: The Stack ADT implementations using Arrays and Linked Lists

Stack applications: Infix to Postfix expression conversions, Evaluation of Postfix expressions, Delimiter Matching.

UNIT -III **(15 Periods)**

Queues: The Queue ADT implementations using Arrays and Linked Lists, The Circular Queue ADT.

Searching: Linear and Binary searching, Hashing-Hash functions, separate chaining, Open Addressing.

UNIT -IV **(15 Periods)**

Trees: Preliminaries - Binary Trees - Expression trees, Binary tree traversals, The search tree ADT-Binary search trees, implementation, Construction of B-trees.

Trees: Heap-building Heap, Heap Sorting, AVL trees-single Rotations, and Double Rotations.

UNIT -V **(15 Periods)**

Internal Sorting: Preliminaries, Bubble sort, Selection sort, Insertion sort, Shell sort, Merge sort, Quick sort, Comparison of searching and sorting in terms of time complexities.

Graphs: Definitions, representations, graph traversals.

Learning Resources:

Text Book:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Second Edition, Pearson

Education

Reference Books:

1. Y.Langsam, M.J.Augeustein and A.M.Tenenbaum, Data Structures Using C, Pearson

Education Asia, 2004.

2. E.Horowitz and Sahani, Fundamentals of Data Structures

3. Debasis Samantha, Classical Data Structures, and PHI

4. Jean Paul Trembly and P.G.Sorenson, An Introduction of Data Structures with Applications.

Web Reference:

1. http://nptel.ac.in/courses/106103069/

IT/CS 205 COMPUTER ORGANIZATION

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- basic organization of computer system.
- design of control unit and I/O organization.
- the concepts of ALU and Pipelining.
- memory organization.

Course Outcomes

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

- familiarize with hardware components of a computer system and various instructions.
- familiarize with Assembly language programs and instruction execution.
- know the design of control unit and various data transfer schemes.
- know the design of ALU and pipelining operations.
- familiarize with memory hierarchy.

UNIT – I **(12 Periods)**

Basic structure of computers: Computer types, Functional units, Basic operational concepts, Bus structures, Performance, multiprocessors and multi computers.

Instructions and Instruction sequencing: Numbers, Arithmetic operations and characters, Memory location and addresses, Memory operations, Instructions and instruction sequencing, Addressing modes.

UNIT – II **(12 Periods)**

Machine instructions and programs: Basic Input and Output operations, Stacks and Queues, Subroutines, Additional instructions, Encoding of machine instructions.

Basic processing unit: Some fundamental concepts, Execution of a complete instruction, multiple bus organization.

UNIT – III **(12 Periods)**

Control unit organization: Hard wired control, Micro programmed control.

Input/Output Organization: Accessing I/O devices, Interrupts, Direct memory access, Buses.

UNIT – IV **(14 Periods)**

Arithmetic: Addition and subtraction of signed numbers, Multiplication of positive numbers, Signed operand multiplication, Integer division, Floating point numbers and operations.

Pipelining: Basic concepts, Data hazards, Instruction hazards, Influence of instruction sets, Data path and control considerations, Performance considerations.

UNIT – V **(14 Periods)**

The Memory system: Some basic concepts, Semi conductor RAM memories, Read only memories, speed, size and cost.

Cache and Secondary Memory: Cache memories, Performance considerations, Virtual memories, Secondary storage.

Learning Resources:

Text Book:

1. Computer Organization - Carl Hamacher, ZvonkoVranesic, SafwatZaky, Fifth Edition, McGraw Hill.

Reference Books:

1. Computer Architecture and Organization-John P.Hayes, Third Edition, McGraw Hill.
2. Computer Organization and Architecture - William Stallings, Sixth Edition, Pearson/PHI.
3. Computer Systems Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

IT/CS 206

DISCRETE MATHEMATICAL STRUCTURES

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- problem solving strategies and methods of proof.
- model and analyze computational processes using combinatorial methods.
- problem solving using recurrence relations.
- binary and n-ary relations and their applications.
- the basic concepts of graphs.

Course Outcomes

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

- apply Propositional logic and first order logic to solve problems.
- apply basic counting techniques to solve combinatorial problems.
- formulate and solve recurrence relations.
- know binary relations on sets and use directed graphs for representing relations.
- formulate and solve graph problems.

UNIT – I **(12 Periods)**

Foundations: Sets, Relations and Functions, Methods of Proof and Problem Solving Strategies, Fundamentals of Logic, Logical Inferences, Methods of Proof of an Implication.

Foundations: First Order Logic & Other Methods of Proof, Rules of Inference for Quantified Propositions, Mathematical Induction.

UNIT – II **(12 Periods)**

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations.

Elementary Combinatorics: Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions.

UNIT – III **(12 Periods)**

Recurrence Relations: Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Solving Recurrence Relations by Substitution and Generating Functions.

Recurrence Relations: The Methods of Characteristic Roots, Solutions of Inhomogeneous Recurrence Relations.

UNIT – IV **(12 Periods)**

Relations and Digraphs: Relations and Directed Graphs, Special Properties of Binary Relations.

Relations and Digraphs: Equivalence Relations, Operations on Relations.

UNIT – V **(12 Periods)**

Ordering Relations: Ordering Relations, Lattices and Enumerations, Paths and Closures, Directed Graphs and Adjacency Matrices.

Graphs: Basic Concepts, Isomorphisms and Subgraphs, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four Color Problem.

Learning Resources:

Text Book:

1. Joe L. Mott, Abraham Kandel & Theodore P. Baker, Discrete Mathematics for Computer
Scientists & Mathematicians, PHI 2nd Edition.

Reference Books:

1. C.L. Liu and D.P. Mohapatra-Elements of Discrete Mathematics, Tata McGraw-Hill, 3rd Edition.
2. Kenneth H Rosen-Discrete Mathematics & its Applications, TMH, 6th Edition.
3. J.P.Trembly and R.Manohar, Discrete Mathematical Structures with Applications to Computer Science: TMH.

IT 251
BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

- To provide hands-on experience with elementary electrical and electronic devices and circuits.
- To learn principles of operation of fundamental electronic devices such as PN Junction diodes, Transistors, FETs and UJTs.
- To learn Diode characteristics, and basic diode applications as rectifiers and regulators.
- To learn BJT and MOSFET characteristics and basic transistor applications as amplifiers

Course Outcomes

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

- know working of electronic devices, analyze and design.
- calculate the parameters from the characteristics like static, dynamic and reverse resistances of PN junction diode.
- design the Zener voltage regulator to meet the Specifications.
- verify experimentally popular BJT applications such as Amplification and digital logic.

List of Experiments*:*

1. Verification of KVL & KCL.
2. Parameters of choke coil.
3. Verification of Thevenin's Theorem.
4. Verification of Superposition theorem.

5. Verification of maximum power transfer theorem.
6. Time response of RL & RC Circuits.
7. Time response of RLC Circuits.
8. Characteristics of Silicon, Germanium diodes.
9. Characteristics of Zener diode.
10. Half Wave Rectifier and Full Wave Rectifier.
11. Transistor Characteristics in CE configuration.
12. Characteristics of FET.
13. Self Bias circuit.
14. Wein Bridge Oscillator.
15. Colpitt's Oscillator.

IT 252 DATASTRUCTURES LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course, the student will understand

- linked list ADTs and applications.
- ADT's of stack and queue and stack applications.
- searching, sorting and hashing techniques.
- binary trees and BSTADT and graph traversals.

Course Outcomes

At the end of the course, the student will be able to implement

- different types of linked list ADT's, and applications.
- stack and queue ADT's using arrays and linked lists and applications.
- searching, hashing techniques.
- BST ADT and Expression tree.
- different sorting algorithms.

Lab Cycles:

1. Write C programs to perform the following ADT operations on singly linked list and Double linked list.
   a) Creation b) insert at beginsc) insert at end d) insert after specified position
   e) Deletion f) display g) search an element h) sorting the listi) reversing the list
   j) Concatenation of two linked lists.
2. If L1 and L2 are two sorted singly linked lists, write a C program to perform the following operations
   a) L1 U L2 b) L1 ∩ L2

3. Write a C program to perform insertion and deletion operations on single circular linked list.
4. Write a C program to perform polynomials addition and multiplication using linked lists.
5. Write a C program that reads two lists of elements, prints the lists, reverses the lists, prints the reverse lists, sorts the lists, prints the sorted lists, merges the lists and prints the merged list.
6. Write a C program to implement stack using arrays and linked lists.
7. Write a C program to convert infix expression to postfix expression and evaluation of postfix expression.
8. Write C programs to implement Queues using arrays and linked list.
9. Write a C program that reads postfix arithmetic expression, builds an Expression tree and perform tree traversals on it.
10. Write a C program to construct Binary search tree and to perform the following operations.
    a. Insertion
    b. Deletion
    c. Find min
    d. Find max
    e. Searching
    f. Sorting
11. Write C programs to implement Hashing Techniques.
12. Implement the following sorting techniques.
    a. Selection sort
    b. Insertion sort
    c. Shell sort
    d. Quick sort
    e. Merge sort
    f. Heap sort

IT 253 PROFESSIONAL COMMUNICATION SKILLS LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

- Improve the dynamics of professional presentations.
- Develop the ability to compeer professional occasions.
- Enable to read news paper for their communicative competence.
- Equip with effective business correspondence.
- Develop in them communication and social graces necessary for functioning.
  - I. for employable ready skills
  - II. win in the job interviews
  - III. build confidence to handle professional tasks.

Course Outcomes

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

- develop effective communication and presentation skills.
- learn corporate etiquette - organizing and managing professional events.
- understand how reading enhances their communicative competency.
- conduct effective correspondence and prepare reports which produce results.
- develop all-round personalities with a mature outlook to function effectively in different circumstances.
- know his/her skills and abilities for better career plans.

I. Presentation skills:

a. Key presentation skills inspired by Steve Jobs – You Tube.

b. Personality & finishing skills training videos.

How to make Effective Presentations, Methodology, Structure, using Technology and Conclusion.

II. Speech writing:

a. Welcoming guests on to the stage.
b. Proposing vote of thanks.

Invite and thank people with professional etiquette

III. Reading skills:

a. News paper reading
b. Reading and interpretation

News paper reading – loud reading within the groups.

Reporting the news to one another without the help of the news paper.

(Besides this, motivate students to read News Paper every day without fail.)

IV. Writing Skills:

Report writing

a. Feasibility report
b. Project report

(Writing an Abstract - Parts of a report - Title page – Declaration - Acknowledgements – Table of contents – Introduction – Conclusion – Citations – References – Appendices.)

V. Career skills:

a. Resume & Cover letter.
b. Interview – The purpose & preparation for an interview.

Discover oneself – Self Introduction – Social background (family, home and town) – interests, Hobbies, likes & dislikes (persons, places, food, music, etc) – Strengths, Weaknesses, Skills, Qualities, Achievements – Opinions (love, life, marriage, politics, India, etc) what is life according to me? A creative narration with factual information is expected.

Effective **Resume** writing: structure and presentation – planning and defining the career objective – strengths and skills set – format - cover letter

Facing **Interviews**: Interview Process – Understanding employer expectations – Pre- interview planning – Opening strategies – Answering strategies, Frequently Asked Questions(FAQs).

Learning Resources:

Text Books:

1. Business Communication, II Ed, OUP, by Meenakshi Raman & Prakash Singh , 2012.
2. Technical Communication – English Skills For Engineers, II Ed, OUP, by Meenakshi Rama & Sangeetha Sharma-(Unit – IV). , 2011.
3. Technical Communication- Principles and Practice, II Ed, OUP, by Meenakshi Raman & Sangeetha Sharma-(Unit –V), 2015.

Suggested Software:

1. TOEFL Mastery, Rosetta Stone, TED Talks, Globarena , Clarity.

Web Resources:

www.esl-lab.com, www.eslgold .com

IT/CS 207 NUMBER THEORY AND ALGEBRA

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To get familiarity on divisibility and prime aspects of number theory.
- To get knowledge of congruences and its related theorems.
- To provide sufficient theoretical and analytical background of group theory.
- To make the student to learn concepts of rings, polynomial rings and fields.
- To give an integrated approach to number theory and abstract algebra.

Course Outcomes

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

- know the basic number theory concepts.
- assess the importance of congruences and its related theorems.
- solve group theoretic problems.
- obtain the solution of problems related to polynomial rings and fields.
- apply mathematical concepts in relevant engineering applications.

UNIT - I **(12 Periods)**

Theory of Numbers: divisibility, the division algorithm, greatest common divisor, the Euclidean algorithm.

Prime Numbers: primes, fundamental theorem of arithmetic.

UNIT - II **(12 Periods)**

Congruences: Congruences, solution of congruences, congruences of degree 1, Euler's phi-function.

Congruence Theorems: Fermat's theorem, Euler's theorem, Wilson's theorem, chinese remainder theorem.

UNIT - III **(12 Periods)**

Group theory: Group, subgroup, direct product of two groups, homomorphism, isomorphism, congruence relations, factor group, normal subgroup, homomorphism theorem for groups (without proof).

Group theory theorems: Lagrange's theorem, Fermat's little theorem, principal theorem on finite abelian groups (without proof).

UNIT - IV **(12 Periods)**

Rings Theory: Rings, fields, Wedderburn's theorem (without proof), ideal, homomorphism theorem(without proof), maximal ideals.

Rings of Polynomials: Rings of polynomials, degree of a polynomial, fundamental theorem of algebra(without proof), division algorithm, greatest common divisor, prime polynomials, unique factorization theorem(without proof).

UNIT - V **(12 Periods)**

Fields: Integral domains and fields, subfield, extension field, prime field, prime fields theorem.

Finite Fields: Finite field, primitive element, order of a finite field, Galois field, cyclotomic polynomial, irreducible polynomials over finite fields.

Learning Resources:

Text Books:

1. Niven.I, Zuckerman.H.S., and Montgomery, H.L., An Introduction to Theory of Numbers, John Wiley and Sons, Singapore, 2004. (UNIT – I & UNIT –II)
2. Lidl.R., and Pilz. G., Applied Abstract Algebra, Springer-Verlag, New Delhi, 2nd Edition. (UNIT – III TO UNIT –V)

Reference Books:

1. V. Shoup, A computational Introduction to Number Theory and Algebra, Cambridge University Press.
2. Thomas Koshy, Elementary Number Theory with Applications, Elsevier Publications, New Delhi.

IT/CS 208
MICROPROCESSORS AND INTERFACING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To understand the architecture of 8086 family, addressing modes, instructions and assembler directives of 8086 microprocessors.
- To develop the programming skills for applying them on various applications.
- To understand the 8086 system connections.
- To understand the 8086 interrupts and interrupt responses.
- To understand the digital interfacing with 8086.

Course Outcomes:

- Students will be able to use 8086 microprocessor addressing modes, registers and instruction sets.
- Students will be able to debug their assembly language programs.
- Students will be able to understand the Minimum mode and Maximum mode configurations during Read and Write machine cycles.
- Students will be able to understand interrupts and interrupt responses.
- Students will able to understand digital interfacing with 8086.

UNIT – I **(14 Periods)**

The 8086 Microprocessor Family: The 8086 Internal Architecture, Introduction to Programming the 8086,Addresing modes, writing programs using with an assembler , Assembly language program development tools,8086 Instruction descriptions and Assembler directives.

UNIT – II **(12 Periods)**

8086 Strings : 8086 strings Instructions, writing Assembly language program using strings, Procedures and Macros:8086 CALL, RET, PUSH and POP instructions, 8086 stack , A near procedure call example, passing parameters to from procedures, reentrant and recursive procedures, writing programs using assembler macros.

UNIT – III **(13 Periods)**

8086 System Connections Timing: 8086 pin Diagram,8086 minimum mode configuration, 8086 maximum mode configuration ,system bus timing ,Bus activities (timing diagrams) during the Read and Write Machine Cycles. Addressing memory and ports in microcomputer systems: address decoder concepts, An example ROM decoder, An example RAM decoder, 8086 Memory Banks.

UNIT – IV **(15 Periods)**

8086 Interrupts and Interrupts Responses : 8086 Interrupt types, an8086 Interrupt response example for type 0, software Inrerrupts, INTR (Hardware) Interrupts, 8259 Priority Interrupt Controller, DMA Controller.

UNIT – V **(15 Periods)**

Digital Interfacing: 8255A Internal block diagram and system connections, 8255A operation modes and initialization ,Constructing and sending 8255A control words, Interfacing Microprocessor to keyboards: Keyboard circuit connections and Interfacing, software keyboard Interfacing, Interfacing to alphanumeric displays.

Learning Resources:

Text Book:

1. Douglas V. Hall, Microprocessor and Interfacing, Revised 2nd Edition, TMH, 2006.

Reference Books:

1. Yu-cheng Liu, Glenn A. Gibson, Microcomputer systems: The 8086 /8088 Family architecture, Programming and Design, Second edition, Prentice Hall of India, 2003.
2. 2.John Uffenbeck, the 80X86 Family, Design, Programming and Interfacing, 3rd Edition, Pearson Education, 2002.

Web References:

http://en.wikipedia.org/wiki/Intel_8086
http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/Microprocessors%20and%20Microcontrollers/pdf/Teacher_Slides/mod1/
http://www.cpu-world.com/Arch/8086.html
http://vmcpatiala.com/download/1271489378.pdf

IT/CS 209 THEORY OF COMPUTATION

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- concepts of Finite automata theory and its applications.
- finite Automata with **ϵ**- Transitions, Regular expressions, and Regular languages.
- properties of Regular languages and Context-free grammars.
- push-down automata, Context-free languages and its properties.
- turing machines and undecidability.

Course Outcomes

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

- design finite state machines.
- design ϵ-NFA, conversion between Finite automata and Regular expressions.
- apply pumping lemma for Regular languages, construct parse trees for CFG and ambiguous grammars.
- construct push-down automata and apply pumping lemma for CFL.
- design Turing Machines and analyze Undecidability.

UNIT - I **(15 Periods)**

Automata: Introduction to Automata, The central concepts of automatatheory - Alphabets, Strings, Languages.

Finite Automata: An Informal picture of finite automata, Deterministic finite automata (DFA) - Definition of DFA, DFA processing strings, Notations for DFA, Extended transition

function, the language of DFA, Non deterministic finite automata (NFA) - Definition of NFA, Extended transition function, the language of NFA, Equivalence of DFA and NFA.

Finite Automata with ϵ-transitions: Use of **ϵ-**transition, notation for an**ϵ-**NFA,**ϵ-**closures, extended transitions and languages, Applications, Moore and mealy machines.

UNIT - II **(14 Periods)**

Regular Expressions and Languages: Regular expressions, finite automata and regular expressions, Algebraic laws of regular expressions.

Properties of Regular Languages: Proving languages are not regular -Pumping lemma for regular languages, Applications of the pumping lemma, Closure Properties of Regular Languages, Equivalence and minimization of automata - Minimization of DFA

UNIT - III **(14 Periods)**

(Construction based treatment & proofs are excluded)

Context Free Grammars: Context Free Grammars, Parse Trees, Constructing parse trees, derivations and parse trees, ambiguous grammars.

Pushdown Automata: Definition of the Pushdown automata, the languages of PDA, Equivalences of PDA's and CFG's.

UNIT - IV **(14 Periods)**

Context free languages: Normal form's for context- Free grammars, the pumping lemma for context free languages.
Properties of Context free languages: closure properties for contextfree languages, Decision properties for CFL's.

UNIT - V **(13 Periods)**

Introduction to Turing Machines: The Turing Machine, programmingtechniques for Turing machines.
Undecidability: a language that is not recursively enumerable, anundecidable problem that is RE, Undecidability problems about TM, Post's Correspondence problem.

Learning Resources:

Text Book:

1. John.E.Hopcroft, R.Motwani, & Jeffery.D Ullman, Introduction to Automata Theory, Languages and Computation, 3rdEdition, Pearson Education, 2009.

Reference Books:

1. Daniel I.A. Cohen, Introduction to Computer Theory, 4thEdition,John Wiley & sons, 2003.
2. KLP Mishra & N.Chandrasekharan, Theory of Computation, 3rdEdition,PHI,2006.

IT/CS 210 DATABASE MANAGEMENT SYSTEMS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- fundamental concepts of database system.
- conceptual data modeling and relational data model.
- advanced formal relational Languages and SQL.
- database design and Implementation.
- various modules in Database management system.

Course Outcomes

At the end of the course the students will be able to

- familiarize with fundamental concepts of database and various database architectures.
- design relations for Relational databases using conceptual data modelling.
- implement formal relational operations in relational algebra and SQL.
- identify the normalization process for relational databases.
- use mechanisms for the development of multi user database applications.

UNIT –I **(15 Periods)**

Introduction to Databases: Introduction - An Example - Characteristics of the Database Approach - Actors on the Scene - Workers behind the Scene - Advantages of Using the DBMS Approach - A Brief History of Database Applications.

Overview of Database Languages and Architecture: Data Models, Schemas, and Instances - Three-Schema Architecture and Data Independence - Database Languages and Interfaces - The Database System Environment - Centralized and Client/Server Architectures for DBMSs - Classification of Database Management Systems.

UNIT –I I (15 Periods)

Conceptual Data Modeling Using Entities and Relationships : Using High-Level Conceptual Data Models for Database Design – A Sample Database Application - Entity Types, Entity Sets, Attributes, and Keys - Relationship Types, Relationship Sets, Roles, and Structural Constraints - Weak Entity Types - Refining the ER Design for the COMPANY Database - ER Diagrams, Naming Conventions, and Design Issues.

The Basic Relational Model : Relational Model Concepts - Relational Model Constraints and Relational Database Schemas - Update Operations, Transactions, and Dealing with Constraint Violations - Relational Database Design Using ER-to-Relational Mapping.

UNIT –III (15 Periods)

Formal Relational Languages: Unary Relational Algebra Operations-Relational Algebra Operations from Set Theory - Binary Relational Operations: JOIN and DIVISION - Additional Relational Operations - The Tuple Relational Calculus - The Domain Relational Calculus.

SQL: SQL Data Definition and Data Types - Specifying Constraints in SQL – Basic Retrieval Queries in SQL- INSERT, DELETE, and UPDATE Statements in SQL-More Complex SQL Retrieval Queries- Views (Virtual Tables) in SQL-Schema Change Statements in SQL.

UNIT –IV (15 Periods)

Database Design Theory: Informal Design Guidelines for Relation Schemas - Functional Dependencies - Normal Forms Based on Primary Keys: 1NF, 2NF, 3NF - Boyce-Codd Normal Form-Multi valued Dependency and Fourth Normal Form- Join Dependencies and Fifth Normal Form.

Normalization Algorithms: Inference rules, Equivalence, Closure set and minimal cover in Functional Dependencies-Properties of Relational Decompositions - Algorithms for Relational Database

Schema Design – About Nulls, Dangling Tuples and Alternative Relational Designs.

UNIT –IV (15 Periods)

Foundations of Database Transaction Processing: Introduction to Transaction Processing - Transaction and System Concepts - Desirable Properties of Transactions - Characterizing Schedules Based on Recoverability - Characterizing Schedules Based on Serializability.

Introduction to Protocols for Concurrency Control in Databases: Two-Phase Locking Techniques for Concurrency Control - Concurrency Control Based on Timestamp Ordering – Multi version Concurrency Control Techniques - Validation (Optimistic) Concurrency Control Techniques.

Introduction to Database Recovery Protocols : Recovery Concepts - Recovery Techniques Based on Deferred Update - Recovery Techniques Based on Immediate Update - Shadow Paging.

Learning Resources:

Text Book:

1. Database Systems, Ramez Elmasri and Shamkant B.Navathe, Pearson Education, 6th edition.

Reference Books:

1. Introduction to Database Systems, C.J.Date, Pearson Education, Fifth edition.
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGrawHill 3rd Edition.
3. Data base System Concepts, Silberschatz, Korth, McGraw hill, 5th edition.

IT/CS 211 JAVA PROGRAMMING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- the basic concepts of Java programming.
- design and development of secure and extendable Java applications.
- the concepts of exception handling, multi-threading, streams and applet programming.
- AWT, Swing components, and event handling mechanism.
- Programming features of JDBC and Networking.

Course Outcomes

At the end of the course the students will be able to

- familiarize with the syntax and semantics of Java programming language.
- develop simple Java applications.
- implement multitasking, File management, and web applications.
- design and implement GUI applications with Java AWT and Swing components.
- develop applications using JDBC and socket API.

UNIT – I **(12 Periods)**

Introduction: The History and Evolution of Java, an Overview of Java.

Data Types, Variables, and Arrays: The primitive types, variables, type conversion and casting, Automatic Type Promotion in Expressions, Arrays, Operators, Control statements.

Introducing Classes : Class fundamentals, Declaring the objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this keyword, Garbage Collection, the finalize() Method.

A Closer Look at Methods and Classes: Overloading Methods, Using objects as Parameters, Returning Objects, Introducing Access control, Understanding static and final keywords, Nested and Inner Classes, Varargs.

UNIT – II (12 Periods)

Inheritance: Inheritance Basics, Using super, Creating multilevel Hierarchy, When Constructors are
executed, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, using final with Inheritance, The Object class.

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Default Interface Methods, Use static Methods in an Interface.

String Handling: String class, StringBuffer class, StringBuilder Class.

UNIT – III (14 Periods)

Exception Handling: Fundamentals, Exception types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses.

Multithreaded Programming : The Java Threaded Model, The Main Thread , Creating a Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Inter Thread Communication, Suspending, Resuming, Stopping Threads, Obtaining A Thread's State.

I/O Basics: Streams, Byte streams, Character streams, Reading Console Input, Writing Console Output, The PrintWriter Class, Reading and Writing Files.

UNIT – IV **(14 Periods)**

The Applet Class: Applet Basics, Applet Architecture, An Applet Skeleton, Simple Applet Display Methods, Requesting Repainting, The HTML APPLET Tag, Passing Parameters to Applets.

Event Handling: Two Event Handling Mechanisms, The Delegation Event Model, Event Classes, The KeyEvent Class, Sources of Events, Event Listener Interfaces, Using The Delegation Event Model, Adapter Classes , Inner Classes.

Introducing the AWT: Working with Windows, Graphics and Text, Using AWT Controls, Layout Managers and Menus.

UNIT – V **(14 Periods)**

Introducing GUI Programming With Swing: Introducing Swing, Exploring Swing –Jlabel and ImageIcon, JTextField, The Swing Buttons, JTabbedPane, JScrollPane JList, JComboBox, Trees and JTable.

JDBC Conectivity: JDBC connectivity, types of Jdbc Drivers, connecting to the database, JDBC Statements, JDBC Exceptions, Manipulations on the database.

Networking: Networking Basics, The Networking Classes and Interfaces, InetAddress, TCP/IP Client sockets, URL, URL connection, TCP/IP sockets Server Sockets, Datagrams

Learning Resources:

Text Books:

1. Herbert Schildt, Java The Complete Reference 9th Edition, McGraw Hill Education(India) Private Limited, New Delhi.
2. Cay Horstmann, John Wiley and Sons, Big Java 2nd Edition, PearsonEducation.

Reference Books:

1. H.M.Dietel and P.J.Dietel,Java How to Program, Sixth Edition, Pearson Education/PHI.
2. Y.DanielLiang,Introduction to Java programming, Pearson Publication.

Web References:

1. http://www.cplusplus.com/reference/
2. http://en.cppreference.com/w/
3. http://www.decompile.com/
4. http://www.programmingsimplified.com/cpp
5. http://www.learncpp.com/
6. http://www.stroustrup.com/

IT/CS 212 OPERATING SYSTEMS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- basics of computer system and operating system overview.
- concepts of process and thread management and process Synchronization.
- deadlock handling techniques and I/O Management.
- memory management techniques.
- concepts of File management and Secondary storage Management.

Course Outcomes

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

- familiarize with different types of operating systems and services.
- familiarize with process management, multithreading and dead lock handling mechanisms.
- familiarize with different memory management mechanisms
- familiarize with I/O Management, Secondary storage management and file management of various operating systems.

UNIT – I **(12 Periods)**

Computer System And Operating System Overview: Overview Of Computer System Hardware, Operating System Objectives And Functions, Evaluation Of Operating System, Example

Systems, Operating System Services, System Calls, System Programs.

Process Management: Process Description, Process Control, Process States, Cooperating Processes, Inter –Process Communication.

UNIT – II (12 Periods)

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms and Evaluation, Threads Overviews, Threading Issues.

Concurrency: Principles of Concurrency, Mutual Exclusion, Software and Hardware Approaches, Semaphores, Monitors, Message Passing, Classic Problems Of Synchronization.

UNIT – III (12 Periods)

Principles Of Deadlock: System Model, Deadlock Characterization, Methods For Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery From Deadlocks, Dining Philosopher's Problem.

I/O Systems: I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Request to Hardware Operations, Streams.

UNIT – IV (12 Periods)

Memory Management: Basic Concepts, Swapping, Contiguous Memory Allocation, Paging, Segmentation.

Virtual Memory: Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing.

UNIT-V

File Management: File System-File Concepts, Access Methods, Directory Structure, File System Mounting, File Sharing And Protection, Implementing File System-File System Structure And Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency And Performance.

Secondary Storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure.

Security: Security Threats, Protection.

Learning Resources:

Text Books:

1. Operating System Principles-Abraham Silberchatz, Peter B, Galvin, Greg Gange 7th Edition, John Wiley.
2. Operating Systems, Internal and Design Principles, Stallings, Fifth Edition-2005, Pearson education/PHI.

Reference Books:

1. Operating system A Design Approach-Crowley, TMH.
2. Modern Operating Systems, Andrew S Tenenbaum 2nd Edition Pearson/PHI.
3. "An Introduction to Operating Systems, Concepts and Practice", PHI, 2003-Pramod Chandra P. Bhat.
4. Operating Systems- A concept based approach –DM Dhamdhere -2nd Edition TMH.

IT254 MICROPROCESSORS&INTERFACING LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

- To develop the microprocessor based programs for various problems.
- To develop the microprocessor based programs for various applications.

Course Outcomes

- Students will be able to gain the logical development programs on the 8086 microprocessor.
- Students will be able to interface 8086 microprocessor for various simple applications

Lab Cycles

1. Write a 8086 assembly language program to add two sixteen bit numbers and to subtract two sixteen bit numbers.
2. Write an assembly language program to verify the following logical operations on 16 bit numbers, AND,OR,XOR and also find 1's complement and 2's complement of 16 bit number
3. Write a 8086 assembly language program to arrange the given numbers in ascending order.
4. Write a 8086 assembly language program to count number of +ve elements, -ve elements, zeros in the given array.
5. Write a 8086 assembly language program to find the square of a number using look-up-table.
6. Write a 8086 assembly language program to move a string byte from a memory location to another memory location.

7. Write a 8086 assembly language program to calculate the maximum and minimum in an array.
8. Write a 8086 assembly language program to convert BCD to binary using near procedures.
9. Write a 8086 assembly language program to n_{cr} by using near procedures.
10. Write a program to display a string of characters (use Keyboard / Display Interfacing).
11. Write a program to generate an interrupt using 8259 Interrupt Controller. Assume two sources are connected to the IR lines of the 8259. Of these Key board has highest priority and printer has lowest priority.
12. Write a8086 Assembly language to interface a 8-bit D-A converter and convert digital to analog (generate square and triangular).
13. To write an ALP to control the stepper motor and its speed of operation

Note: A minimum of 10 Experiments have to be performed and recorded by the candidate to attain eligibility for university practical Examination.

IT255 DATABASE MANAGEMENT SYSTEMS LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- the concepts of Database system and Client Server Architecture
- the concepts of Relational Data Model, Security and Integrity.
- SQL concepts and PL/SQL programs.
- the concepts of Transaction Control and Data Control language.

Course Outcomes

At the end of the course the students will be able to

- populate and query a database using SQL DDL and DML commands.
- declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
- manipulate Database with basic and complex queries.
- implement programs using PL/SQL stored procedures, stored functions, cursors and packages.
- implement schema for RDBMS using schema builder, oracle forms by form builder and reports with query builder.

Lab Cycles:

1. DDL Commands.
    a. Creating objects: tables and views.
    b. Altering the Schema of objects.
    c. Dropping the objects.

2. Simple queries: selection, projection, sorting on a simple table.
    a. Small-large number of attributes.

b. Distinct output values.
c. Renaming attributes.
d. Computed attributes.
e. Simple-complex conditions (AND, OR, NOT)
f. Partial Matching operators (LIKE, %, _, *, ?)
g. ASC-DESC ordering combinations
h. Checking for Nulls

3. Multi-table queries(JOIN OPERATIONS)
   a. Simple joins (no INNER JOIN)
   b. Aliasing tables - Full/Partial name qualification
   c. Inner-joins (two and more (different) tables)
   d. Inner-recursive-joins (joining to itself)
   e. Outer-joins (restrictions as part of the WHERE and ON clauses)
   f. Using where & having clauses
4. Nested queries
   a. In, Not In
   b. Exists, Not Exists
   c. Dynamic relations (as part of SELECT, FROM, and WHERE clauses)
5. Set Oriented Operations
   a. Union
   b. Difference
   c. Intersection d. Division
6. TCL Commands
   a. Privilege management through the Grant/Revoke commands
   b. Transaction processing using Commit/Rollback
   c. Save points.

7. PL/SQL Programming I
   a. Programs using named and unnamed blocks
   b. Programs using Implicit and Explicit Cursors
   c. Exception Handling
8. PL/SQL Programming II

a. Creating stored procedures, functions and packages
b. Triggers and auditing triggers

9. DDL statements using Schema Builder.
10. Report Generation Using Query Builder and data Base Interaction through form Builder.

IT256 JAVA PROGRAMMING LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- basic concepts of java programming.
- design and develop secure and extendable java applications
- concepts of exception handling, multi-threading, streams and applet programming.
- AWT, Swing components, and event handling mechanism.
- programming features of JDBC and Networking.

Course Outcomes

At the end of the course the students will be able to

- familiar with the syntax and semantics of java programming language.
- develop secure java applications.
- construct simple Java user interfaces.
- develop event driven GUI and web based applications.
- develop the applications to interact with Database and Networking.

List of Programs:

1. Write a java program to demonstrate static member, static method and static block.
2. Write a java program to demonstrate method overloading and method overriding.
3. Write a java program to demonstrate finals, blank finals, final methods, and final classes.

4. Write a java program to demonstrate synchronized keyword.
5. Write a java program to implement multiple inheritance.
6. Write a program to demonstrate packages.
7. Write a java program to crate user defined exception class and test this class.
8. Write an applet program to demonstrate Graphics class.
9. Write GUI application which uses awt components like label, button, text filed, text area, choice, checkbox, checkbox group.
10. Write a program to demonstrate MouseListener, MouseMotionListener, KeyboardListener, ActionListener, ItemListener.
11. Develop swing application which uses JTree, Jtable, JComboBox.
12. Write a program to demonstrate login validation using rich GUI components.
13. Write a JDBC Application to implement DDL and DML commands.
14. Write a program to implement client/server applications using connection oriented & connection less mechanisms.

III

YEAR

IT/CS 301 COMPUTER NETWORKS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- fundamental concepts of computer networks.
- different error control, flow control techniques and Collision-Free Protocols.
- various routing, congestion control algorithms and QoS techniques.
- internetworking and design issues of transport layer.
- reliable and unreliable services in transport layer.

Course Outcomes

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

- know various network architectures and functionality of physical layer.
- familiarize with data link layer protocols and Collision-Free Protocols.
- apply different routing, congestion control algorithms with QoS techniques.
- know various internet protocols, design issues and elements of transport layer.
- recognize transport layer protocols and various application layer protocols.

UNIT – I **(10 Periods)**

Introduction: Uses of Computer Networks, Network Hardware, Network Software, Reference Models.

The Physical Layer: The Theoretical Basis for Data Communication**,** Guided Transmission Media, Digital Subscriber Lines, Switching.

UNIT – II (12 Periods)

The Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols.

The Medium Access Control Sub-layer: Multiple Access Protocols- ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Ethernet**,** Data Link Layer Switching.

UNIT – III (13 Periods)

The Network Layer: Network Layer Design Issues, Routing Algorithms-Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast routing, multicast routing, Congestion control algorithms, Quality of Service-Application Requirements, Traffic Shaping, Packet Scheduling, Admission Control.

UNIT – IV (13 Periods)

The Network Layer: Internetworking, The Network Layer in the Internet-The IP version 4.0 protocol, IP Addresses, IP Version 6.0, Internet Control Protocols, Label Switching and MPLS.

The Transport Layer: The Transport Service-Services Provided to the Upper Layers, Transport Service Primitives, Elements of Transport Protocols –Addressing, Connection Establishment, Connection Release, Error Control and Flow Control, Congestion

control-Desirable Bandwith allocation, Regulating the sending rate.

UNIT – V **(12 Periods)**

The Transport Layer: The Internet Transport Protocols: Introduction to UDP, Remote procedure call, Real-Time transport protocols, Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release.

The Application Layer: DNS- The Domain Name System, Electronic mail.

Learning Resources:

Text Book:

1. Andrew S. Tanenbaum, David J.Wetherall, Computer Networks, Fifth Edition, Pearson Education.

Reference Books:

1. James F.Kurose, Keith W.Ross, Computer Networking, Third Edition, Pearson Education
2. Behrouz A Forouzan, Data Communications and Networking, Fourth Edition, TMH (2007).
3. Kurose & Ross, *COMPUTER NETWORKS*, A Top-down approach featuring the Internet, Pearson Education, Alberto Leon, Garciak.

IT/CS 302 WEB TECHNOLOGIES

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- basic technologies to develop web documents.
- dynamic HTML Pages and Event handling mechanism.
- XML, Web Servers and Ruby scripting.
- java Servlet technologies.
- rich internet applications.

Course Outcomes

At the end of the course the students will be able to

- create static web pages using XHTML, CSS, and JavaScript.
- design dynamic WebPages using client side scripting.
- create XML documents and work with web servers to create web applications with ruby on rails platform.
- write server side programs with Java Servlet Technologies.
- design Rich Internet Applications with AJAX.

UNIT – I **(15 Periods)**

Introduction: Introduction to HTML5 Part-1 and Part-2.

Introduction to Cascading Style Sheets (CSS): Part 1 and Part 2.

UNIT – II **(15 Periods)**

JavaScript-1: Introduction to Scripting and Control Statements-I & II.

JavaScript: Functions, Arrays and Objects.

UNIT – III **(15 Periods)**

DOM: Objects and Collections and Event Handling.

XML and RSS: Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions(DTDs), W3C XML Schema Documents, XML Vocabularies Extensible Style sheet Language and XSL Transformations, Document Object Model (DOM), RSS.

UNIT – IV **(15 Periods)**

Web Servers: Introduction, HTTP Transactions, Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, Accessing Web Servers.

Ruby on Rails: Introduction, Ruby Script, Rails framework, Database driven web application.

UNIT – V **(15 Periods)**

Servlets: Servlet Life cycle, Thejavax.servlet package, The javax.servlet.http package, Generic Servlet, Http Servlet, Servlet Parameters, Handling Http Request & Responses, Cookies, Session Tracking.

Ajax-Enabled Rich Internet Applications: Introduction, Rich Internet Applications (RIAs) with Ajax, History of Ajax, Raw Ajax Example Using the XMLHttpRequest Object.

Learning Resources:

Text Book:

1. Harvey M. Deitel and Paul J.Deitel, "Internet & World Wide Web How to Program", Pearson Education, 2012.

Reference Books:

1. Subrahmanyam Allamaraju and Cedric Buest, 'Professional Java Server Programming: J2EE.
2. Jason Cranford Teague "Visual Quick Start Guide CSS, DHTML & AJAX", 4/e, "Perason Education".
3. Tom Nerino Doli Smith "JavaScript & AJAX for the Web" Pearson Education, 2007.
4. Hal Fulton "The Ruby Way", 2/e, Pearson Education, 2007.
5. David A. Black "Ruby for Rails" Dreamtech Press, 2006.
6. Bill Dudney, Johathan Lehr, Bill Willies, Lery Mattingly "Mastering Java Server Faces" Wiely India, 2006.
7. Web Technology – Uttam K.Roy, Oxford University Press, 2010.

Web References:

1. www.deitel.com
2. www.w3schools.com
3. www.tutorialspot.com

IT/CS 303 DESIGN& ANALYSIS OF ALGORITHMS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- methods for designing efficient algorithms using various data structures.
- the performance analysis of algorithms.
- the application of mathematical tools in computing to solve fundamental problems.
- the concepts of classification of algorithms.

Course Outcomes

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

- compute time and space complexity of algorithms.
- deduce the recurrence relations that describe the time complexity of recursively-defined algorithms, and solve recurrence relations.
- design algorithms using divide and conquer, greedy, and dynamic programming strategies and recite algorithms that employ these strategies.
- design algorithms using backtracking and branch and bound strategies and recite algorithms that employ these strategies.
- know the fundamental concepts of classification of algorithms.

UNIT – I **(15 Periods)**

Introduction: Algorithm, Algorithm specification, performance analysis, Divide and Conquer- The general method. Running time calculation of Divide and Conquer technique.

Divide and Conquer: Finding maximum and Minimum, Merge sort, quick sort, Strassen's matrix multiplication.

UNIT – II **(15 Periods)**

The Greedy Method: The general method, Knapsack Problem, Tree vertex splitting, Job sequencing with deadlines.

The Greedy Method: Minimum-cost spanning trees – Kruskal, Prims, Single source shortest paths.

UNIT – III **(15 Periods)**

Dynamic Programming: The General method, Multi-stage graph, All pairs shortest path, Single-source shortest path, Optimal Binary search trees.

Dynamic Programming: String Editing, 0/1 Knapsack, Reliability design, The traveling salesman problem.

UNIT – IV **(15 Periods)**

Basic traversal & search techniques: Traversal techniques for graphs, connected components & spanning trees, Bi-connected components.

Backtracking: The General Method, The 8-Queens Problem, Graph coloring, Hamiltonian cycle, Knapsack problem.

UNIT – V **(15 Periods)**

Branch and Bound: The general method, 0/1 Knapsack problem, Traveling salesperson.

NP hard and NP Complete Problems: Basic concepts, Cook's Theorem statement.

Learning Resources:

Text Book:

1. L Ellis Horwitz, SartajSahni and Sanguthevar Rajasekaran 'Fundamentals of Computer Algorithms', Second edition, Galgotia Publications.

Reference Books:

1. The design and analysis of algorithms ANOVA, Hopcraft.J.E, Ullman.J.D, First edition, Pearson publishers.
2. Introduction to algorithms, Third edition, Thomos H Cormen, Charles E Leisevson, Ronald ,Revart Clifford stein, PHI.

IT/CS 304 UNIX PROGRAMMING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- UNIX Architecture and its key features.
- different UNIX commands and AWK programming.
- functions of UNIX shells and the concepts of Bourn shell programming.
- file and process management system calls and signal handling mechanism in UNIX.
- IPC mechanisms like pipes, sockets, shared memory, and semaphores and UNIX internals.

Course outcomes

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

- use UNIX commands for solving problems and work with AWK programming.
- write shell scripts for solving problems that can't be solved by simple commands.
- use system calls for system programming.
- implement client/server communication using IPC mechanisms.
- use resources of computers effectively and efficiently.

UNIT – I **(15 Periods)**

Introduction: UNIX architecture, Features of UNIX.

UNIX Utilities: pwd, mkdir, ls, cd , rmdir, , cat, more, page, head, tail, Editing a file: vi, cp, mv, rm, wc, ln, unlink, chmod,

chown, chgrp, who, sort ,nl, grep, egrep, fgrep, find, cmp, diff, uniq, tr, sed, cut, paste, join, tee, tty.

Programmable text processing: **AWK** - awk programs, accessing individual fields, Begin and end, operators, variables, control structures, extended regular expressions, condition ranges, field separators, Built - in functions.

UNIT – II **(15 Periods)**

UNIX Shells: Introduction, shell functionality, Built - in commands, meta characters, input/output redirection, filename substitution, pipes, command substitution, sequences, grouping commands, background processing, scripts, subshells, shell variables, Quoting.

Bourne Shell: Working with variables, Arithmetic, conditional expressions, control structures, positional parameters, passing command line arguments, shell programs, functions, and arrays.

UNIT – III **(15 Periods)**

File management : Introduction to system calls and file management, Regular file management system calls - open( ), read( ), write( ), lseek( ), Close(),unlink( ),stat( ), getdents( ). Miscellaneous file management system calls - chown( ) and fchown( ), chmod( ) and fchmod( ), dup( ) and dup2( ),fcntl( ), ioctl( ), link( ), mknod( ), sync( ), truncate( ) and ftruncate( ).

Process Management: Inroduction,Creating a new process- fork( ),orphan processes, terminating a process - exit( ), zombie processes, waiting for a child - wait( ), Differentiating a process - exec( ), changing directories - chdir( ), changing priorities- nice( ), Accessing user and Group ID's.

Signals: Introduction, A list of signals, terminal signals, Requesting an Alarm signal - alarm( ), handling signals - signal( ), protecting critical code and chaining interrupt handlers, sending

signals - kill( ), Death of children, suspending and Resuming processes, process Group's and control terminals.

UNIT – IV **(15 Periods)**

Inter process communication: Pipes and Sockets.

Inter process communication: shared memory and semaphores.

UNIT – V **(15 Periods)**

UNIX Internals: Kernel Basics, the File System, Process Management.

UNIX Internals: Memory Management, Input/Output.

Learning Resources:

Text Book:

1. Unix for programmers and users, Graham Glass, King Ables, 3rd edition, Pearson education.

Reference Books:

1. "Advanced programming in the unix environment", W. Richard Stevens 3rd Edition Pearson education.
2. "Unix programming environment", Kernighan W.Brian and Pike Rob, Pearson education.
3. "Your Unix the ultimate guide", Sumitabha Das, 3rd edition, TMH.
4. "Advanced UNIX programming" by Marc J.Rochkind, 2nd edition Pearson Education.
5. The "C" Odyssey UNIX - The Open, Boundless C, Mehta Gandhi, Rajiv Shah, Tilak Shetty, BPB Publications.

IT/CS 305 COMPILER DESIGN

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- phases of compiler and lexical analyzer.
- parsing techniques and syntax direct translation schemes.
- run-time storage allocations strategies and symbol table implementation.
- intermediate code forms and code generation.

Course Outcomes

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

- familiarize with phases of compiler and Lexical analysis.
- implement Parsers.
- create symbol tables and specify various intermediate code forms for compiler construction
- design code generator through optimized intermediate code forms.
- specify the various code optimization methods and runtime allocation strategies.

UNIT – I **(12 Periods)**

Introduction to Compiling: Compilers - Analysis of the source program - Phases of a compiler - Cousins of the Compiler - Grouping of Phases - Compiler construction tools.

Lexical Analysis: Role of Lexical Analyzer - Input Buffering - Specification of Tokens-Recognition of tokens- a language for specifying lexical analyzers- design of a lexical analyzer generator.

UNIT – II **(14 Periods)**

Syntax Analysis: Role of the parser - Top Down parsing - Recursive Descent Parsing, Predictive Parsing, LL(1) Parser - Bottom-up parsing - Shift Reduce Parsing , Operator Precedent Parsing .

Bottom-up parsing - LR Parsers - SLR Parser, Canonical LR Parser, and LALR Parser-Yacc Tool.

UNIT – III **(12 Periods)**

Symbol Tables: Symbol table entries, Data structures for symbol tables implementation, representing scope information.

Syntax Directed Translation: Syntax Directed definition-construction of syntax trees.

Intermediate Code Generation: Intermediate languages – SDT scheme for Assignment Statements - SDT scheme for Case Statements.

UNIT – IV **(12 Periods)**

Back patching - SDT scheme for Boolean Expressions, SDT scheme for Flow of control constructs - SDT scheme for Procedure calls.

Code Generation: Issues in the design of code generator - The target machine - Runtime Storage management - Basic Blocks and Flow Graphs - Next-use Information - A simple Code generator - DAG representation of Basic Blocks.

UNIT – V **(14 Periods)**

Code Optimization: Introduction- Principal Sources of Optimization - Optimization of basic Blocks - Introduction to Global Data Flow Analysis- Peephole Optimization.

Run Time Environments: Source Language issues - Storage Organization - Storage Allocation strategies –Static allocation scheme, Stack allocation scheme, Heap allocation scheme- Access to non-local names - Parameter Passing methods.

Learning Resources:

Text Book:

1. Alfred Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers Principles, Techniques and Tools", Pearson Education Asia, 2007.

Reference Books:

1. Alfred V.Aho, Jeffrey D. Ullman, Principles of Compiler Design, Narosa publishing, 2002.
2. Lex&Yacc - John R. Levine, Tony Mason, Doug Brown, 2nd Edition, O'reilly.
3. Engineering a Compiler - Keith Cooper & Linda Torezon, 2nd Edition Elsevier.

IT/CS 306 SOFTWARE ENGINEERING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- basic concepts of Software Engineering methods and practices.
- software and requirements modeling
- software design concepts
- software quality Management
- software testing techniques

Course Outcomes

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

- identify, formulate, and solve real world problems
- elicit, analyze and specify software requirements from various stakeholders
- participate in design, development, deployment and maintenance of software projects
- test and assess the quality of the systems build
- evaluate the impact of potential solutions to complex problems in a global society.

UNIT – I (12 Periods)

Software and Software Engineering: The nature of Software, Software Engineering, The Software Process, Software Engineering Practice, Software Myths.

The software Process: Process models: A Generic process model, Process Assessment and Improvement. Prescriptive Process Models, Specialized Process models, The Unified

Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development: What Is Agility? What Is an Agile Process? , Extreme Programming(XP),Other Agile process models, A Tool Set for the Agile Process.

UNIT – II (12 Periods)

Modeling: Principles that guide Practice: Software Engineering Knowledge, Core Principles, Principles that guide each framework activity.

Understanding Requirements: Requirements Engineering, Establishing the Groundwork, Eliciting requirements, Developing Use Cases, Building the requirements Model, Negotiating requirements, Validating Requirements.

Requirements Modeling: Scenarios, Information, and Analysis Classes: Requirement Analysis, Scenario-based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class Based Modeling.

UNIT – III (12 Periods)

Requirements Modeling: Flow, Behavior, Patterns and WebApps

Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modeling, Requirements Modeling for WebApps.

Design Concepts:Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model.

Architectural Design:
Software Architecture, Architectural Genres, Architectural Styles, Architectural Design, Assessing Alternative Architectural Designs, Architecture Mapping Using Data Flow.

UNIT – IV (12 Periods)

Component-Level Design: What is a Component?, Designing Class-Based Components, Conducting Component-Level Design, Component-level Design for WebApps, Designing Traditional Components, Component Based Development.
Quality Management: Quality Concepts: What is Quality? Software Quality, the Software Quality Dilemma, Achieving Software Quality.
Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps Validation Testing, System Testing, The Art of Debugging

UNIT – V (12 Periods)

Testing Conventional Applications: Software testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing, Model-Based Testing, Testing for Specialized Environments, Architectures, and Applications, Patterns for Software Testing.
Process And Project Metrics: Metrics in the process and Project Domains, Software Measurements, Metrics for Software Quality, Integrating Metrics within the Software Process, Metrics for small Organizations, Establishing a Software Metrics Program.
Estimation for Software Projects: Observations on Estimation, The Project Planning Process, Software Scope and Feasibility, Resources, Software Project Estimation, Decomposition

Techniques, Empirical Estimation Models, Estimation for Object-Oriented Projects, Specialized Estimation Techniques, the Make/Buy Decision.

Learning Resources:

Text Book:

1. Software Engineering A Practitioner's Approach Roger S.Pressman,Seventh Edition.

Reference Books:

1. Ian Sommerville, 'Software Engineering', Sixth Edition, Pearson Education.
2. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, 'Fundamentals of Software
3. Engineering', Second Edition, PHI.
4. Rajib Mall, 'Fundamentals of Software Engineering', Second Edition, PHI.

IT 351 WEB TECHNOLOGIES LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- basic technologies to develop web documents.
- dynamic HTML Pages and Event handling mechanism.
- XML, Web Servers and Ruby scripting.
- Java Servlet technologies.
- rich internet applications.

Course Outcomes

At the end of the course the students will be able to

- create static web pages using XHTML, CSS, and JavaScript.
- design dynamic webpages using client side scripting.
- create XML documents and work with web servers to create web applications with ruby on rails platform.
- write server side programs with Java Servlet Technologies.
- design Rich Internet Applications with AJAX.

Lab Cycle

1. Develop a simple static website using XHTML.
2. Develop a simple static web page using different types of styles in CSS.
3. Write java scripts covering Function, recursive functions, Arrays and Objects.
4. Write a program on collection objects.

5. Write a program on event bubbling and mouse event model.
6. Write well-formed and valid XML documents.
7. Write code for displaying XML using XSL.
8. Write Programs on Ruby & Ruby on Rail.
9. Write a program on Generic Servlets.
10. Write a program on Http Servlets.
11. Write programs on cookie and session.
12. Design a Rich Internet Application using AJAX.

IT 352 DESIGN & ANALYSIS OF ALGORITHMS LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- fundamental algorithmic problems
- methods of designing and analyzing algorithms
- various designing paradigms of algorithms for solving real world problems.

Course Outcomes

At the end of the course the students will be able to

- analyze the efficiency and correctness of algorithms.
- implement algorithms using various design strategies.
- choose appropriate algorithmic design technique to solve a given problem.

Lab Cycle

1. Write a program to find min-max using DAC.
2. Write a program to find the k^{th} smallest element using DAC.
3. Write a program to find the optimal profit of a Knapsack using Greedy method
4. Write a program to determine the path length from a source vertex to the other vertices in a given graph . (Dijkstra's algorithm)
5. Write a program to find the minimum cost of a spanning tree for the given graph. (Kruskal's algorithm)

6. Write a program to determine shortest path in a multi stage graph using forward and backward approach
7. Write a program to find all pair shortest path from any node to any other node within a graph.
8. Write a program to find the spanning trees using DFS and BFS graph traversals.
9. Write a program to find the bi-connected components in a graph
10. Write a program to find the non attacking positions of Queens in a given chess board using backtracking
11. Write a program to color the nodes in a given graph such that no two adjacent can have the same color using backtracking
12. Write a program to find the optimal profit of a Knapsack using Branch and Bound Technique.

IT 353 UNIX PROGRAMMING LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course objectives

At the end of the course the students will understand

- various UNIX commands and AWK programming.
- concepts of Bourn shell programming.
- file and process management system calls.
- signal handling mechanisms in UNIX.
- various IPC mechanisms like pipes, sockets, shared memory, and semaphores.

Course outcomes

At the end of the course the students will be able to

- use UNIX commands for solving problems and write AWK programmes.
- write shell scripts for solving problems
- use file and process management system calls for system programming.
- implement signal handling mechanisms.
- implement client/server communication using IPC mechanisms.

Lab Cycle I: (Using Commands and Shell Programming)

1. Working with different UNIX commands.
    a. Directory utilities
    b. Text processing utilities
    c. File processing utilities
    d. Network utilities
    e. Disc utilities

2. Working with AWK Programming.

Lab Cycle II: (Using Shell Programming)

3. Write Shell Programs which takes two file names as arguments, if their contents are same then delete the second file.

4. Write Shell Programs for the following
   a) To verify whether permissions, contents and size of two given files are same or not.
   b) To display the name, maximum file size and no. of files in each subdirectory of a given directory.
   c) To display the current users, their home directory and period of working of each users.

5. Write Shell Programs for the following
   a) To display the given arguments in reverse order
   b) To simulating a calculator
   c) To count no. of lines, characters, words in a given file

6. Write shell script for the following
   a) For sorting, searching and insertion, deletion of elements in the list
   b) To delete all lines which match the given word in the files supplied as arguments.

Lab Cycle III: (File & Process Management Programming)

7. Write a C program for copy data from source file to destination file, where the file names are provided as command-line arguments.
8. Write a C program for demonstrating dup and dup2 system calls.
9. Write a C program that prints files recursively in a given directory.

10. Write a C program to create a process by using fork( ) system call.
11. Write a C program to create an Orphan Process.
12. Write a C program to demonstrate Zombie process.

Lab Cycle IV: (Signals)

13. Write a C program for requesting an alarm signal to execute user defined alarm handler.
14. Write a C program to demonstrate terminal signals (control-c & control-z).
15. Write a C program to override child termination signal by the parent process.
16. Write a C program to demonstrate Suspending and Resuming Processes.
17. Write a C program to protect a critical region of code from a specific signal.
18. Write a C program to implement abort function using signals.

Lab Cycle V: (IPC Programming)

19. Write a C program for Un-named pipes to send data from first process to the second process.
20. Write two C programs that demonstrate Named pipes, Reader and Writer Processes.
21. Write C programs to demonstrate IPC through semaphores & shared memory.

Note: A minimum of 15(Fifteen) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

IT/CS 307 NETWORK PROGRAMMING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- client/server programming design issues and protocols.
- elementary TCP/UDP system calls.
- performance of server process using threads
- TCP client/server design alternatives.

Course Outcomes

At the end of the course the students will be able to

- familiarize the basics of network programming.
- implement client/server applications using elementary socket functions.
- develop concurrent client/server programs using multiplexing system calls.
- write client/Server program using threads and compare different TCP client/server design alternatives.

UNIT – I **(15 Periods)**

Introduction: A Simple Daytime Client , Protocol independence, Error Handling, A Simple Daytime Server, OSI model, Unix Standards, 64 bit architectures.

The Transport Layer: Introduction, User datagram Protocol (UDP), Transmission Control Protocol (TCP), TCP Connection Establishment and Termination, TIME_WAIT State, Port Numbers, TCP Port Numbers and Concurrent Servers, Buffer Sizes and Limitations, Standard Internet Services, Protocol Usage.

UNIT – II **(15 Periods)**

Sockets Introduction: Introduction, Socket Address structures, Value-Result Arguments, Byte Ordering Functions, inet_aton, inet_addr,and inet_ntoa Functions, inet_pton and inet_ntop Functions,sock_ntop and Related Functions, readn, writen and readline Functions

Elementary TCP Sockets: Introduction, socket Function, connect Function, bind function, listen function, accept Function, fork and exec Functions, Concurrent Servers, close Function, getsockname and getpeername Functions

UNIT – III **(15 Periods)**

TCP Client-Server Example: Introduction, TCP Echo Server: main Function, TCP Echo Server: str_echo Function, TCP Echo Client: main Function, TCP Echo Client: str_cli Function, Normal Startup, Normal Termination, POSIX Signal Handling, Handling SIGCHLD Signals, wait and waitpid Functions, Connection Abort before accept Returns, Termination of Server Process, SIGPIPE Signal, Crashing of Server Host, Crashing and rebooting of Server Host

I/O Multiplexing: The select and poll Functions: Introduction, I/O Models, select Function, str_cli Function, Batch Input and Buffering, shutdown Function, str_cli Function,TCP Echo Server,pselect Function,poll Function,TCP Echo Server

UNIT – IV **(15 Periods)**

Elementary UDP Sockets: Introduction, recvfrom and sendto Functions, UDP Echo Server: main Function, UDP Echo Server:dg_echo Function, UDP Echo Client: main Function, UDP Echo Client:dg_cli Function, Lost Datagrams, Verifying Received Response, Server Not Running, Summary of UDP Example, connect Function with UDP, dg_cli Function (Revisited), Lack of Flow Control with UDP, Determining Outgoing Interface with UDP,TCP and UDP echo Server Using select

Daemon Processes and the inetd Superserver: Introduction, syslogd Daemon, syslog Function, daemon_init Function, inetd Daemon, daemon_inetd Function

UNIT – V (15 Periods)

Threads: Introduction, Basic Thread Functions: Creation and Termination, str_cli Function Using Threads, TCP Echo Server Using Threads, Thread-Specific Data, Web Client and Simultaneous Connections, Mutexes:Mutual Exclusion, Condition Variables, Web Client and Simultaneous Connections .

Client/Server Design Alternatives: Introduction, TCP Client Alternatives, TCP Test Client, TCP Iterative Server, TCP Concurrent Server, One Child per Client, TCP Preforked Server, No Locking Around accept, TCP Preforked Server, File Locking Around accept, TCP Preforked Server, Thread Locking Around accept, TCP Preforked Server, Descriptor Passing, TCP Concurrent Server, One Thread per Client, TCP Prethreaded Server, per-Thread accept, TCP Prethreaded Server, Main Thread accept.

Learning Resources:

Text Book:

1. W.Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network Programming. The Sockets Networking API, Volume 1 , 3rd edition, 2004.

Reference Books:

1. Douglas E.Comer, David L.Stevens, Internetworking With TCP/IP: Design, Implementation and Internals,prentice hall,1991.
2. Rochkind, Advanced Unix Programming, Addison-Wesley Professional,2nd edition.

Web References:

1. http://www.pearsoned.co.in/wrichardstevens
2. http://www.iana.org

T/CS 308 DATA ENGINEERING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- basics of data warehousing and data mining.
- data pre-processing and association rule mining techniques.
- classification techniques.
- applications of data mining on complex data objects.
- clustering techniques.

Course Outcomes

At the end of the course the students will be able to

- apply fundamental concepts for the construction of Data Warehouse.
- familiarize with Data Mining concepts.
- extract association rules from transactional databases.
- demonstrate different classification techniques and data mining concepts on complex data objects.
- implement various clustering techniques.

UNIT – I **(15 Periods)**

Data Warehousing and Online Analytical Processing: Data Warehouse: Basic Concepts- Data Warehouse Modeling: Data Cube and OLAP-Data Warehouse Design and Usage- Data Warehouse Implementation.

Data Preprocessing: An overview of Data Preprocessing- Data cleaning- Data Integration- Data Reduction- Data Transformation and Data Discretization.

UNIT – II **(15 Periods)**

Getting to know Your Data: Data Objects and Attribute Types- Basic Statistical Descriptions of Data- Measuring Data Similarity and Dissimilarity.

Introduction: Why Data Mining- What is Data Mining?-What Kinds of Data can be mined?- What Kinds of Patterns can be mined?- Which Technologies are used?- Major Issues in Data Mining.

UNIT – III **(15 Periods)**

Mining Frequent Patterns, Associations, and Correlations: Basic Concepts- Frequent Item set Mining Methods: Apriori Algorithm, Generating Association Rules, Improving the efficiency of Apriori.

Frequent Item set Mining Methods: FP Growth Approach for Mining Frequent Item Sets, Mining Frequent Item Sets using Vertical Data Format Method.

Advanced Pattern Mining: Mining Multilevel Associations- Mining Multidimensional Associations- Mining Quantitative Association Rules.

UNIT – IV **(15 Periods)**

Classification: Basic Concepts- Decision tree induction- Bayes Classification Methods- Rule-Based Classification- Model Evaluation and Selection- Techniques to Improve Classification Accuracy.

Advanced Methods in Classification: Bayesian Belief Networks-Classification by Back propagation-Classification by Support Vector Machines-Lazy Learners-Other Classification Methods.

UNIT – V **(15 Periods)**

Cluster Analysis: Introduction to cluster analysis- partitioning methods- Hierarchical methods- Density-Based Methods:DBSCAN - Grid-based Methods:STING.

Outlier Detection: Outliers and Outlier Analysis- Outlier Detection Methods, Statistical Approaches, Proximity based Approaches.

Learning Resources:

Text Book:

1. Data Mining Concepts & Techniques, Jiawei Han, MichelineKamber, and Jian Pei, 3/e, Morgan Kaufmann Publishers.

Reference Books:

1. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, Addison Wesley., 2006.
2. Data Warehouse Toolkit, Ralph Kimball, 2nd edition, John Wiley Publishers.
3. G.K.Gupta, Introduction to Data Mining with case studies, PHI Publications, 2006.

IT/CS 309
OBJECT ORIENTED ANALYSIS AND DESIGN

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- the fundamental concepts of object-oriented software development and UML Notations.
- UML diagrams for Object Oriented Analysis and Design.
- design patterns for object oriented software development.
- implementation strategies and object oriented project management approaches.

Course Outcomes

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

- construct the requirements model for an Information system.
- formulate a behavioral model and specify the dynamic behavior of the system.
- specify the control and operation specifications of an information system.
- develop a design model using design patterns.
- implement and manage a software project.

UNIT – I **(15 Periods)**

Information Systems- Introduction, Information systems in practice, General system theory, Information and information systems, Problems in Information Systems Development, Avoiding the Problems.

UML- Principles of modelling, Definition of UML, Conceptual model of UML.

Modelling Concepts: Models and diagrams, Drawing Activity Diagrams, Unified Software Development Process;

Requirements Capture: User Requirements, Fact Finding Techniques, User Involvement, Documenting Requirements, Use Cases, Requirements Capture and Modelling;

Agate Ltd Case study - Introduction to Agate Ltd., Requirements Model.

UNIT – II **(15 Periods)**

Requirements Analysis: What Must a Requirements Model Do? Use Case Realization, The Class Diagram, Drawing a Class Diagram, CRC Cards, Assembling the Analysis Class Diagram.

Agate Ltd Case study - Requirements Analysis.

Refining the Requirements Model: Component based development, Adding further structure, Software development patterns.

Object Interaction: Object Interaction and Collaboration, Interaction Sequence Diagrams, Interaction Collaboration Diagrams, Model Consistency;

UNIT – III **(15 Periods)**

Specifying Operations: The Role of Operation Specifications, Contracts, Describing Operation Logic, Object Constraint Language, Creating an Operation Specification;

Specifying Control: States and Events, Basic Notation, Further Notation, Preparing a Statechart, Consistency Checking, Qualify Guidelines;

Moving Into Design: How is Design Different from Analysis?, Logical and Physical Design, System Design and Detailed Design, Qualities and objectives of Analysis and Design, Measurable Objectives in Design, Planning for Design.

UNIT – IV **(15 Periods)**

System Design: The Major Elements of System Design, Software Architecture. Concurrency, Processor Allocation, Data Management Issues, Development Standards, Prioritizing Design Trade-offs, Design for Implementation;

Object Design: Class Specification, Interfaces, Criteria for Good Design, Designing Associations, Integrity Constraints, Designing Operations, Normalization;

Design Patterns: Software Development Patterns, Documenting Patterns-Pattern Templates, Design Patterns, How to Use Design Patterns, Benefits and Dangers of Using Patterns;

UNIT – V **(15 Periods)**

Designing Boundary Classes: The Architecture of the Presentation Layer, Prototyping the User Interface, Designing Classes, Designing Interaction with Sequence Diagrams, The Class Diagram Revisited, User Interface Design Patterns, Modelling the Interface Using State charts;

Implementation: Software Implementation, Component Diagrams, Development Diagrams, Software Testing, Data Conversion, User Documentation and Training, Implementation Strategies, Review and Maintenance;

Managing Object-Oriented Projects: Resource Allocation and Planning, Managing Iteration, Dynamic Systems Development Method, Extreme Programming.

Learning Resources:

Text Books:

1. Object-Oriented Systems Analysis And Design Using UML - Simon Bennett, Steve McRobb and Ray Farmer - Tata McGraw-Hili Edition – 2nd Edition. (UNIT-I to UNIT-V).
2. The Unified Modeling Language User Guide -Grady Booch ,James Rumbaugh and Ivar Jacobson, Addison-Wesley Object Technology Series,2nd edition. (UNIT I – 2nd chapter UML).

Reference Books:

1. James Rumbaugh, Jacobson, Booch, Unified Modeling Language Reference Manual, 2nd Edition, PHI.
2. Jacobson et al., The Unified Software Development Process, AW, 1999.
3. AtulKahate, Object Oriented Analysis &Design, The McGraw-Hill Companies, 2004.

IT/CS 310
CRYPTOGRAPHY & NETWORK SECURITY

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- network security attacks, Classical and symmetric encryption schemes.
- concepts of public key encryption and key management schemes.
- authentication and Secure hash functions.
- network security applications like kerberos , PGP and IP security.
- web security and system security concepts.

Course Outcomes

At the end of the course the students will be able to

- identify common network security vulnerabilities/attacks, classical and symmetric encryption schemes.
- analyze the concepts of public key encryption and key management schemes.
- design MAC and Hashing techniques needed for authentication.
- analyze the IP security header formats and know the applications like kerberos , PGP.
- know the concept of Firewalls configuration, Web security mechanisms and Intrusion detection techniques.

UNIT – I **(14 Periods)**

Introduction: The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, a Model for Network Security.

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography.

Block Cipher Techniques: Block Cipher Principles, The DES, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles, The AES cipher, Block Cipher modes of Operation.

UNIT – II **(12 Periods)**

Introduction to Number Theory: Prime Numbers, Fermat's and Euler's Theorems, Testing for Primality, the Chinese Remainder Theorem, Discrete Logarithms.

Public Key and RSA: Principles of Public –Key Cryptosystems, The RSA algorithm.

Key Management: Key Management, Diffie-Hellman Key Exchange.

UNIT – III **(12 Periods)**

Message Authentication and Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security Hash Functions and MACs,

Hash and MAC Algorithms: Secure Hash Algorithm, HMAC

Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standard.

UNIT – IV **(12 Periods)**

Authentication Applications: Kerberos, X-509 Authentication Service.

Electronic Mail Security: Pretty Good Privacy (PGP).

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay Load, Key Management.

UNIT – V **(10 Periods)**

Web Security: Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

Intruders: Intruders, Intrusion Detection, Password Management.

Firewalls: Firewall Design Principles, Trusted Systems.

Learning Resources:

Text Book:

1. William Stallings, Cryptography and Network Security, 4th Edition, Pearson Education.

Reference Books:

1. BehrouzA.Forouzen, DebdeepMukhopadhyay, “Cryptography & Network Security”, 2nd Edition, TMH.
2. Chalie Kaufman, Radia Perlman, Mike Speciner, “Network Security”, 2nd Edition, (PHI / Eastern Economy Edition)
3. Wade Trappe & Lawrence C.Washington, “Introduction to Cryptography with Coding Theory”, 2/e, Pearson.
4. AtulKahate, “Cryptography & Network Security ", Tata McGraw-Hill, 2003.

IT/CS 311 (A) ARTIFICIAL INTELLIGENCE

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- fundamental concepts of artificial intelligence both theory and practice.
- various search techniques and problem solving methodologies.
- logical representation of searching methods and language sentences.
- concepts of logical agents and first order logic and concepts of logical agents.
- role of various planning techniques in solving problems.

Course Outcomes

At the end of the course the students will be able to

- know fundamental concepts of artificial intelligence, agents, and their environments.
- apply problem solving techniques for solving search problems.
- Know search-based techniques and solve constraint satisfaction problems.
- Know different classical planning methods and represent predicate/ proposition logic and infer new knowledge.
- know various planning techniques.

UNIT – I **(12 Periods)**

Intelligent Agents: What is AI? Agents and Environments

Intelligent Agents: Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents

UNIT – II **(12 Periods)**

Solving Problems by Searching: Problem-Solving Agents, Example Problems, Searching for Solutions

Solving Problems by Searching: Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions

UNIT – III **(12 Periods)**

Adversarial Search: Game, Optimal Decisions in, Alpha—Beta Pruning, Imperfect Real-Time Decisions, Stochastic Games.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems

UNIT – IV **(12 Periods)**

Logical Agents: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic: A Very Simple Logic, Propositional Theorem Proving

First-Order Logic: Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

UNIT – V **(12 Periods)**

Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward, Resolution.

Classical Planning: Definition of Classical Planning, Algorithms for Planning as State-Space Search.

Learning Resources:

Text Book:

1. Stuart Russel and Peter Norvig, Artificial Intelligence – A Modern Approach, 3rd Edition, Pearson Education/ PHI.

Reference Books:

1. Elaine Rich & Kevin Knight, Artificial Intelligence, 3rd Edition, (TMH).
2. Patrick Henry Winston, Artificial Intelligence, Pearson Education.

Web Reference:

1. http://aima.cs.berkeley.edu/

IT/CS 311(B)
PRINCIPLES OF PROGRAMMING LANGUAGES

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- basic concepts for specifying syntax and semantics of programming languages
- principles in contemporary programming languages
- concepts like Support for Object-Oriented Programming and concurrency in various languages.
- exception Handling and Event Handling mechanisms of various programming languages

Course Outcomes

At the end of the course the students will be able to

- know the syntax and semantics of various programming languages.
- describe the usage of data types and statement-level control structural in various languages.
- familiarize the concepts like sub programs and implementation of sub programs.
- familiarize the concepts like, Support for Object-Oriented programming and Concurrency in various languages.
- apply the Exception Handling and Event Handling concepts related to JAVA.

UNIT – I **(12 Periods)**

Describing Syntax and Semantics: Introduction, The General Problem of Describing Syntax, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs: Dynamic Semantics.

Names, Bindings, Type Checking, and Scopes: Introduction, Names, Variables, The Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants.

UNIT – II **(12 Periods)**

Data Types: Introduction, Primitive Data Types, Character String Types, User-Defined Ordinal Types, Array Types, Associative Arrays, Record Types, Union Types, Pointer and Reference Types, Type Checking.

Expressions and Assignment Statements: Introduction, Arithmetic Expressions, Overloaded Operators, Type Conversion, Relational and Boolean Expressions, Assignment Statements, Mixed-mode Assignment.

Statement – Level Control Structures: Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT – III **(10 Periods)**

Subprograms: Introduction, Fundamentals of Subprograms, Design Issues for Subprograms, Parameter-Passing Methods, Parameters That Are Subprograms Names, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, Co-routines.

Implementing Sub Programs: The General Semantics of Calls and Returns, Implementing ”Simple” Subprograms, Implementing Sub Programs with Stack –Dynamic Local Variables, Nested Sub programs, Blocks, Implementing Dynamic Scoping.

UNIT – IV **(12 Periods)**

Support for Object-Oriented Programming: Introduction, Object-Oriented Programming, Design Issues for Object-Oriented Languages, Implementation of Object-Oriented Constructs

Concurrency: Introduction, **Introduction to Subprogram-Level Concurrency,** Semaphores, Monitors, Message Passing

UNIT – V **(14 Periods)**

Exception Handling: Introduction to Exception Handling, Exception Handling in Java.

Event Handling: Introduction to Event Handling, Event Handling with Java.

Learning Resources:

Text Book:

1. Robert W. Sebesta, Concepts of Programming Languages, 10th Edition, Addison Wesley,2012.

Reference Books:

1. Allen B Tucker, Robert E Noonan, Programming Languages, Principles & Paradigms, 2ed,TMH
2. R. Kent Dybvig, The Scheme programming language, Fourth Edition, MIT Press, 2009.
3. Jeffrey D. Ullman, Elements of ML programming, Second Edition, Prentice Hall, 1998.
4. Richard A. O'Keefe, The craft of Prolog, MIT Press, 2009.
5. W. F. Clocksin and C. S. Mellish, Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003.

Web References:

1. http://www.cplusplus.com/reference/
2. http://en.cppreference.com/w/

IT 311(C) MULTIMEDIA SYSTEMS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- standard file formats of image, audio, and video.
- various image, audio and video compression techniques.
- multimedia Media communication and Network techniques with assured Quality of services.

Courses Outcomes

At the end of the course the students will be able to

- develop and handle the Graphics/Image file formats for a computer/smart phones.
- modify and edit various color images, color models.
- use various lossy and lossless compression techniques.
- know various image and video standard formats.
- apply Multimedia data communication.

UNIT – I **(12 Periods)**

Multimedia Authoring and data representations: Introduction to multimedia and hypermedia, WWW, overview of multimedia software tools.

Multimedia Authoring andTools: Multimedia authoring some useful editing and authoring tools, VRML.

Graphics and Image data representation: Graphics/Image data types, popular file formats.

UNIT – II **(12 Periods)**

Color in image and Video: Color models in images, Color models in Video.

Fundamental concepts in video: types of video signals, analog video, digital video.

Basics of Digital Audio: Digitization of sound, MIDI, Quantization and transmission of audio.

UNIT – III **(12 Periods)**

Lossless compression algorithms: Run-length coding, Variable length coding, Dictionary based coding, Arithmetic coding, loss less image compression.

Lossy CompressionAlgorithms: Quantization, Transform coding, Wavelet based coding.

UNIT – IV **(12 Periods)**

Image compression Standards: JPEG standard, JPEG 2000 standard, Bi-level image compression standards.

Basic Video Compression Techniques: Introduction to video compression, Video compression based on motion compensation. Search for motion vectors, H.261, H.263. MPEG Video Coding: MPEG - 1 and MPEG – 2.

UNIT – V **(12 Periods)**

Multimedia Network Communications and applications: Quality of Multimedia data transmission, multimedia over IP, Multimedia over ATM networks Content Based retrieval in **Digital Libraries:** Current Image search systems, C-BIRD, multimedia databases.

Learning Resources:

Text Book:

1. Fundamentals of multimedia, Ze-Nian Li, Mark S. Drew, Pearson education 2007.

Reference Books:

1. Multimedia Applications, Ralf Steinmetz, Klara Nahrstedt, 2007,
2. Multimedia Communications, Applications, Networks, Protocols and Standards Fred Halsall, Pearson Education, 2011.
3. Multimedia systems design, Prabhat K. Andeliegh, Kiran Thakrar, PHI, 2007.
4. Multimedia producers Bible, Ron Goldberg, comdex computer publishing, 1996.

IT 311(D) MOBILE COMPUTING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- architecture for mobile computing.
- wireless communication through telephony and the emerging technologies.
- various wireless communication architectures used in mobile computing.
- messaging services and applications.
- mobile device operating systems.

Course Outcomes

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

- Know the architecture and design considerations for mobile computing.
- recognize the upcoming technologies in mobile computing.
- identify the communication architecture for the applications.
- familiarize with different messaging technologies.
- identify the operating system suitable for the device and the services.

UNIT – I **(12 Periods)**

Introduction: Mobility of Bits and Bytes, Wireless-The Beginning, Mobile Computing, Dialogue Control– Networks, Middleware and Gateways, Application and Services (Contents), Developing Mobile Computing Application s- Security in Mobile Computing, Standards-Why is it Necessary?, Standard Bodies, Players in the Wireless Space.

Mobile Computing Architecture: Internet-The Ubiquitous Network, Architecture for Mobile Computing, Three-Tier Architecture, Design Considerations for Mobile Computing, Mobile Computing through Internet, Making Existing Applications Mobile-Enabled.

UNIT – II **(12 Periods)**

Mobile Computing Through Telephony: Evolution of Telephony, Multiple Access Procedures, Mobile Computing through Telephone, Developing an IVR Application, Voice XML, Telephony Applicatioin Programming Interface (TAPI).

Emerging Technologies: Introduction, Bluetooth, Radio Frequency Identification (RFID), WiMAX, Mobile IP-IPv6, Java Card.

UNIT – III **(12 Periods)**

Global System for Mobile Communications (GSM): GSM Architecture, Entities, Call Routing in GSM, PLMN Interfaces, GSM Addresses and Identifiers, Network Aspects in GSM, GSM Frequency Allocation, Authentication and Security.

CDMA and 3G: Introduction, Spread-Spectrum Technology-Is-95, CDMA Vs GSM, Wireless Data, 3GNetworks & Applications.

GPRS: Packet Data Network, Network Architecture, Network Operations, Data Services in GPRS, Applications for GPRS, Limitations, Billing and Charging.

UNIT – IV **(12 Periods)**

Short Message Service (SMS): Mobile Computing over SMS, SMS, Value Added Services through SMS, Accessing the SMS Bearer.

Wireless Application Protocol (WAP): Introduction, WAP, MMS, GPRS Applications.

UNIT – V **(12 Periods)**

Programming for the PALM OS: Introduction, History of Palm OS, Palm OS Architecture, Application Development, Communication in Palm OS, Multimedia.

Wireless Devices with Windows CE: Introduction, Different Flavors of Windows CE, Windows CE Architecture, Windows CE Development Environment.

Learning Resources:

Text Book:

1.Asoke K Talukder & Roopa R.Yavagal, Mobile Computing, Technology Applications and Service Creation, TMH 2006.

Reference Books:

1. Uwe Hansmann, Lother Merk, Martin S.Nicklous, Thomas Staber, Principles of Computing, 2/e,springer International Edition.
2. J.Schiller, Mobile Communications, Addison-Wesley, 2003.

Web Resource:

http://www.zigbee.org/

IT/CS 312(A) EMBEDDED SYSTEMS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- hardware and software components of an embedded system.
- embedded system software architectures and interrupt mechanisms.
- mechanisms for Synchronization, IPC and RTOS.
- tools for development of Embedded system.

Course Outcomes

At the end of the course the students will be able to

- familiarize with embedded system concepts, hardware and software.
- familiarize with the embedded system architecture and interrupt handling.
- familiarize with solutions for shared data problems.
- familiarize with Memory management techniques and RTOS concepts.
- familiarize with system environment for development of Embedded system

UNIT – I (12 Periods)

A First Look at the Embedded Systems: Examples of Embedded Systems (Telegraph, cordless Bar-code scanner, Laser Printer, underground tank monitor, Nuclear Reactor Monitor), Typical Hardware.

Hardware Fundamentals: Terminology, Gates, A few other basic considerations, Timing Diagrams, Memory.

Advanced Hardware Fundamentals: Micro Processors, Buses, Direct Memory Access, interrupts, other common parts, Built-ins on the Micro Processor, conventions used on the Schematics.

UNIT – II (12 Periods)

Interrupts: Micro Processor Architecture, Interrupt Basics, The shared data problem, Interrupt Latency.

Survey of Software Architectures: Round-Robin, Round-Robin with Interrupts, Function-Queue-Scheduling Architecture, Real Time Operating System Architecture, Selecting an Architecture.

UNIT – III (12 Periods)

Introduction to Real Time Operating Systems: Tasks and Task states, Tasks and data Semaphores and shared data.

More Operating System Services: Message Queues, Mail boxes and pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS environment.

UNIT – IV (12 Periods)

Desktop Operating Systems versus RTOS – need for Board Support Packages – task management – race conditions – priority inversion – scheduling.

Basic Design Using a Real Time Operating System: Overview, Principles, An Example, Encapsulating Semaphores and Queues, Hard Real Time Considerations, Saving Memory Space, Saving Power.

UNIT – V (12 Periods)

Embedded Software Development Tools: Host and Target Machines, Linker/Locators for Embedded Software, Getting Embedded Software into the target System.

Debugging Techniques: Testing on Host Machine, Instruction Set Simulators, the *assert* macro, using Laboratory Tools.

Learning Resources:

Text Books:

1. David E.Simon, An Embedded Software Primer, Pearson Education Asia., 2000. (Units I, II, III and V and 2nd chapter in IV).
2. Sriram V.Iyer, Pankaj Gupta, Embedded Real-time Systems Programming, TataMcGraw Hill publishers, 2004. (First chapter in IV unit).

Reference Books:

1. D.Gajski, F.Vahid, S.Narayan, J.Gong, Specification and Design of Embedded Systems, Prentice Hall of India Pvt. Ltd.
2. Raj Kamal, Embedded Systems Architecture & Programming, Tata McGraw-Hill.

Web References:

1. https://spin.atomicobject.com/.../learn-embedded-systems-programming/
2. http://esd.cs.ucr.edu/
3. www.montefiore.ulg.ac.be/~boigelot/cours/embedded/slides/embedded.pdf

IT/CS 312(B)
ADVANCED DATABASE MANAGEMENT SYSTEMS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, students will understand

- data base systems architecture and catalog and the importance of it in data base technology.
- aggregate operations and outer joins combining operations using pipelining using heuristics in query optimization.
- define and discuss the importance of Distributed Transaction and Recovery Management.
- object Oriented DBMSs Concepts and Design and models required for Object Oriented Data design.
- narrates Emerging database technologies and applications like Mobile databases.

Course Outcomes

At the end of the course, students will be able to

- know System Architecture and Catalog.
- use Distributed database Concepts.
- design Distributed Relational Database system, ORDBMS and Object DBMSs concepts.
- use the solutions related to advanced database concepts.
- familiarize with mobile databases.

UNIT – I (12 Periods)

Data base systems architecture and the system Catalog: System architectures for DBMSs, Catalogs for Relational DBMSs, System catalog information in oracle.

Distributed DBMS Concepts and Design: Introduction, function and architecture of a Distributed DBMS.

UNIT – II (12 Periods)

Distributed DBMS Concepts and Design: Distributed Relational Database Design- transparencies in a Distributed DBMS. Date's Twelve Rules for Distributed DBMS.

Distributed DBMS Advanced Concepts: Distributed Transaction Management, Distributed Concurrency Control - Distributed Deadlock Management Distributed Database Recovery. The X/Open , Distributed Transaction processing model, Replication Servers.

UNIT – III (12 Periods)

Introduction to Object DBMSs: Advanced Database Applications -Weaknesses of RDBMSs, Object oriented Concepts, Storing objects in a Relational Database, Next generation Database systems.

Object Oriented DBMSs Concepts and Design: Introduction to Object Oriented Data Models and DBMSs, OODBMS perspectives, Persistence, Issues in OODBMSs.

UNIT – IV (12 Periods)

Object Oriented DBMSs Concepts and Design: The object Oriented Database, System Manifesto, Advantages and Disadvantages of OODBMSs, Object oriented Database Design.

Object relational DBMSs: Introduction to Object, relational Database systems, the third generation Database manifesto, Postgres, an early ORDBMS, SQL3.

UNIT – V (12 Periods)

Emerging database technologies and applications: Mobile databases, multimedia databases, geographic information systems, genome data management.

XML and Internet Databases: Structured, semi structured, and unstructured data, XML Hierarchical (Tree) Data model.

Learning Resources:

Text Book:

1. Thomas M Connolly and Carolyn E.Begg., Database Systems, A practical approach to design, implementation and management
2. Elmasri Navate, Fundamentals of Database Systems, 5/e, Pearson Education.

Reference Book:

1. Ozsu, Principles of Distributed Database Systems, 2/e, PHI

Web References:

1.www.cs.uoi.gr/~pitoura/grdb01/sylabus.html
2.https://en.wikipedia.org/wiki/Databases
3.www.cs.duke.edu/courses/fall07/cps216/

IT 312(C) GRAPH THEORY

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- basic notions of Graph Theory
- fundamental Theorems in Graph Theory
- algorithmic Graph Theory.

Course Outcomes

At the end of the course the students will be able to

- know the basics of Graph Theory.
- apply Graph Theory for solving Problems.
- know sets and graph coloring problems.
- know the planar and directed graphs.
- apply Graph Theory for solving Network applications.

UNIT – I **(12 Periods)**

Fundamental Concepts: What Is a Graph? Paths, Cycles, and Trails.

Fundamental Concepts: Vertex Degrees and Counting, Directed Graphs.

UNIT – II **(12 Periods)**

Trees and Distance: Basic Properties, Spanning Trees and Enumeration, Optimization and Trees.

Matchings and Factors: Matchings in bipartite graphs, Applications and Algorithms, Matchings in General Graphs.

UNIT – III **(12 Periods)**

Connectivity and Paths: Cuts and Connectivity, k-connected Graphs, Network Flow Problems- maximum network flow, and integral flow.

Coloring of Graphs: Vertex Colorings and Upper Bounds, Structure of k-chromatic Graphs, Enumerative Aspects.

UNIT – IV **(12 Periods)**

Edges and Cycles: Line Graphs and Edge-Coloring, Hamiltonian Cycles.

Planar Graphs: Embeddings and Euler's Formula, Characterization of Planar Graphs, Parameters of Planarity.

UNIT – V **(12 Periods)**

Perfect Graphs: Chordal graphs and other classes of perfect graphs, imperfect graphs, strong perfect graphs.

Matroids, Ramsey Theory, and Eigen values of Graphs.

Learning Resources:

Text Book:

1. Douglas B. West, “Introduction to Graph Theory”, Second Edition, Pearson Education Asia,NewDelhi.

Reference Book:

1. Robin J. Wilson “Introduction to Graph Theory”, Fourth edition, Prentice Hall.

IT 312(D) INDUSTRY RELATED SUBJECT

IT 354 NETWORK PROGRAMMING LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- client/server programs using transport layer protocols.
- iterative and concurrent servers.
- signal handlers in client/server programming.
- concurrent server using Threads.

Course Outcomes

At the end of the course the students will be able to

- design a client/server programs using TCP sockets for given application.
- design a client/server programs using UDP sockets for given application.
- handle different signals in socket programming.
- design and implement multithreaded server for a given application.
- design a client/server using TCP sockets for file transfer.

Lab Cycle

1. Implementation of daytime client/server using TCP.
2. Implementation of Iterative Echo Server using TCP.
3. Implementation of Concurrent Echo Server using TCP.
4. Implementation of file transfer using TCP.
5. Implementation of TCP client/ server to add two integers.
6. Implementation of TCP Echo server using select.

7. Implementation of TCP Echo server using poll.
8. Implementation of Echo Server using UDP.
9. Implementation of TCP and UDP Echo server using select.
10. Implementation of daytime Server as a daemon.
11. Implementation of TCP echo server using threads.
12. Demonstrate the use of mutex to protect a shared variable.

IT 355 DATA ENGINEERING LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- basics of data warehousing and data mining.
- data pre-processing and association rule mining techniques.
- clustering techniques.
- classification and applications of data mining on complex data objects.

Course Outcomes

At the end of the course the students will be able to

- apply fundamental concepts for the construction of Data Warehouse.
- familiarize with Data Mining concepts.
- use preprocessing techniques.
- extract association rules from transactional databases
- implement various clustering techniques
- demonstrate different classification techniques and data mining concepts on complete data objects.

Lab Cycle

1. Creating Star Schema/snowflake Schema / Fact constellation Schema using any tool
   a) All Electronics sales application.
   b) Identify the facts and dimensions for banking environment.
2. Compute all the cuboids of 4D cube using group-bys.

3. Compute all the cuboids of 4D cube using Rollup and Cube operators of oracle SQL.
4. SQL queries for implementing different OLAP operations.
5. Deploy data cube using a software tool.
6. Design and develop different types of data transformations using a software tool.
7. Build ETL solutions using a software tool.
8. Write high level language programs to implement different data preprocessing techniques.
9. Implement various classification techniques on data sets using a data mining tool.
10. Estimate the values of numeric attributes, through prediction, using a data mining tool.
11. Mine strong association rules out of a given data set using a mining tool.
12. Cluster the given set of data objects by applying various clustering techniques using a data mining tool.
13. Write high level language programs to implement Association rule mining/classification/clustering techniques.

Note: A minimum of 10 (Ten) programs should be completed and recorded by the candidate to attain eligibility for Semester End Practical Examination.

IT 356 OBJECT ORIENTED ANALYSIS AND DESIGN LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course, the student will understand

- the importance of a component and functionality of each UML model element throughout the software process.
- how to read and interpret the artifacts of requirements that are used as starting points for analysis and design.
- analysis of interactions of analysis classes in identify design model elements.
- analyze and Design a model or a software component for a particular application or software project

Course Outcomes

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

- know the importance of systems analysis and design in solving computer Based problems.
- develop UML models which are used during the phases of the Rational Unified Process.
- analyze interactions among analysis classes for developing the class model and identify the dynamic behaviour of the system.
- identify the functionality of each UML model in developing and deploying object-oriented software.

Lab Cycle - I

ANALYSIS

1. Problem Statement
2. Requirements elicitation
3. System Requirements Specification

USECASE VIEW

4. Identification of Actors
5. Identification of Use cases
6. Flow of Events
7. Construction of Use case diagram
8. Building a Business Process model using UML activity diagram

Lab Cycle - II

LOGICAL VIEW

9. Identification of Analysis Classes.
10. Identification of Responsibilities of each class.
11. Construction of Use case realization diagram.
12. Construction of Sequence diagram.
13. Construction of Collaboration diagram.
14. Identification of attributes of each class.
15. Identification of relationships of classes.
16. Analyzing the object behavior by constructing the UML State Chart diagram.
17. Construction of UML static class diagram.

Lab Cycle - III

DESIGN AND IMPLEMENTATION

18. Refine attributes, methods and relationships among classes.
19. Construction of UML component diagrams.
20. Construction of UML deployment diagrams.

MINI PROJECT

The above three cycles are to be carried out in the context of a problem / system chosen by the Project batch and a report is to be submitted at the semester end by the batch.

IV YEAR

IT/CS 401 DISTRIBUTED SYSTEMS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- basics in distributed systems and their architectures .
- multi-threading concepts and communication models in distributed systems.
- naming and synchronization among distributed applications.
- consistency protocols and Replica management in distributed file system.
- paradigms used to organize distributed systems.

Course Outcomes

After completion of this course, Students will able to

- know the basic issues and communication mechanisms in distributed systems.
- design the communication models in distributed systems.
- acquaint with naming and synchronization of distributed applications.
- know recovery from faults.
- familiarize with distributed file based and web based paradigms.

UNIT - I **(12 Periods)**

Introduction: Definition of a Distributed System, Goals, types of distributed systems.

Architectures: Architectural Styles, System Architectures, Architectures Versus Middleware, Self-Management In Distributed Systems.

UNIT - II (12 Periods)

Processes: Threads, Virtualization, Clients, Servers, Code Migration.

Communication: Fundamentals, Remote Procedure Call, Message-Oriented Communication, Stream-Oriented Communication, Multicast Communication.

UNIT - III (12 Periods)

Naming: Names, Identifiers, And Addresses; Flat Naming, Structured Naming, Attribute-Based Naming.

Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning Of Nodes, Election Algorithms.

UNIT - IV (14 Periods)

Consistency and Replication: Introduction, Data-Centric Consistency Models, Client-Centric Consistency Models, Replica Management, Consistency Protocols.

Fault Tolerance: Introduction To Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.

UNIT - V **(12 Periods)**

Distributed File Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance.

Distributed Web-Based Systems: Architecture, Processes, Communication, Naming, Synchronization, Consistency and Replication, Fault Tolerance.

Learning Resources:

Text Book:

1. Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems: Principles and Paradigms,

2nd Edition, Pearson Education/PHI.

Reference Books:

1. GeorgeCoulouris, Jean Dollimore, Tim Kindberg, Distributed Systems Concepts and Design
3rd edition, Pearson Education.
2. MukeshSinghal&NiranjanG.Shivaratri, Advanced Concepts in Operating Systems, Tata Mc-
Graw Hill edition 2001.
3. Pradeep Kumar Sinha, Distributed Operating System - Concepts and Design, PHI.

Web References:

1. www.cis.upenn.edu/~lee/00cse380/lectures/
2. www.cs.uah.edu/~weisskop/Notes690/

IT/CS 402 WEB SERVICES

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- J2EE Multi-Tier architecture.
- server side scripting with Java Server Pages.
- XML parsers and Enterprise Java beans.
- RMI, Java Mail and Corba.
- web services and its related technologies.

Course Outcomes

At the end of the course the students will be able to

- design dynamic web pages with JSP.
- develop DOM and SAX parsers.
- createEnterprise Java Beans.
- use Java Mail, RMI and Corba in real time web applications.
- create and consume Web Services.

UNIT – I **(15 Periods)**

J2EE Introduction, J2EE Multi-Tier Architecture

Java Server Pages: JSP Scripting Elements and Directives, JSP implicit Objects, JSP Standard Actions, JSP Using Java Beans, JSP with cookies and sessions.

UNIT - II **(15 Periods)**

JSP Tag Extensions: JSP Tag Lifecycle, creation of custom JSP tag libraries.

Java and XML: Generating an XML document, XML - DOM Parser, and SAX parser.

UNIT - III **(15 Periods)**

Enterprise JavaBeans: Session Beans, Message Driven Beans, Entity Beans.

Java Mail API

UNIT - IV **(15 Periods)**

Java Interface Definition Language and CORBA
Java Remote Method Invocation
Web Services

UNIT - V **(15 Periods)**

SOAP
Universal Description, Discovery
Web Services Description Language (WSDL)

Learning Resources:

Text Books:

1. Jim Keogh, The complete Reference J2EE, Tata McGraw Hill.

Reference Books:

1. SubrahmanyamAllamraju et.al, Professional Java Server Programming, SPD/ APress.
2. Stephanie Bodoff, Eric Armstrong, Jennifer Ball, Debbie Bode Carson, Lan Evans, Dale Green, Kim Haase, Eric Jendrock, The J2EE Tutorial, Pearson Education.
3. DreamtechSoftwre Team, Java Server Programming, Dream tech Press.
4. James McGovern & Rahim Aditya, J2EE 1.4 Bible, Wiley publications.
5. B.V.Kumar, S.Sangeetha, S.V.Subrahmanya, J2EE Architecture, Tata McGraw Hill.

Web References:

1. https://msdn.microsoft.com/en-us/library/bb628649.aspx
2. www.aspsnippets.com/

IT/CS 403 MOOCS

CE 404/A BASIC SURVEYING
[OPEN ELECTIVE]

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To study about the various surveying instruments.
- To study the basics of chain survey in linear measurements.
- To determine the relative positions of the existing features on the ground.
- To obtain basic knowledge on Total Station.
- To acquaint with procedures of leveling by dump level & auto level.

Course Outcomes

At the end of the course, students will be able

- to Know about the various surveying instruments.
- to determine the relative positions of a point on the existing ground by conducting the survey.
- to use all basic surveying instruments.
- to operate Total Station instrument.
- to take the levels of existing ground and to determine the reduced levels.

UNIT – I **Surveying Vol. I by Dr. K. R. Arora** **(12 Periods)**

Surveying & Measurements: Definitions; Classification; Principles of Surveying; Basic measurements in surveying; Instruments used for different measurements; Units of measurement (linear & Angular); Plan and map; Scales used for Maps and plans; Phases of survey work and Duties of a surveyor. Procedures for distance measurement - Ranging, Chaining/taping a line.

UNIT – II Surveying Vol. I by Dr. K. R. Arora (12 Periods)

Chain Surveying: Principle of Chain surveying; Basic definitions; Well-Conditioned & Ill-Conditioned triangles; Selection of stations and survey lines; Procedure of Field Work in Chain Surveying; Off-sets; Booking the survey (Field Book); Conventional Symbols; Problems encountered in chaining; Obstacles in chain Surveying.

UNIT – III Surveying Vol. I by Dr. K. R. Arora (12 Periods)

Compass Surveying: Angles and Bearings; Instruments used to measure angles and bearings; Designation of Bearings; Fore and Back Bearings; Calculation of Included Angles from Bearings and Bearings from Included Angles; Prismatic & Surveyor's Compass; Magnetic Dip & Declination; Local Attraction and Corrections.

UNIT – IV Surveying Vol. I by Dr. K. R. Arora (12 Periods)

Theodolite Surveying: Types of Theodolites; Vernier Theodolite - Essential Parts; Basic definitions; Temporary adjustments; Field operations - Measurement of horizontal angles(Repetition & Reiteration), vertical angles.

Total Station: Introduction; components of Total Station; Types of Prisms and targets used in total station; various advantages of Total Stations.

UNIT – V Surveying Vol. I by Dr. K. R. Arora (12 Periods)

Simple Leveling: Basic definitions; Curvature and Refraction; Different methods of leveling; Levels - Dumpy level, Tilting level, Auto level; Leveling staff; Level field book; Booking and reducing levels; Classification of direct differential leveling methods -Fly leveling, Check leveling, Profile leveling and Cross sectioning, Reciprocal leveling and Precise leveling; Sources of errors & Difficulties in leveling.

Learning Resources:

Text Books:

1. Surveying Vol. I & II by Dr. K. R. Arora,11th Edition, Standard Book House,2012.
2. Surveying Vol. I & II by S K Duggal, 4th Edition, McGraw Hill Education (India) Private Limited, 2013.

Reference Books:

1. Surveying Vol. I&II by B.C. Punmia, Laxmi Publications,2005.
2. Surveying and Levelling by N.N Basak, McGraw Hill Education (India) Private Limited,2014.
3. Plane Surveying by AM Chandra, 2nd Edition, New Age International (P) Ltd.,2006.

Web References:

1. http://nptel.ac.in/courses/105104101/
2. http://nptel.ac.in/courses/105107121/
3. http://nptel.ac.in/courses/105107122/

CE 404/B BUILDING MATERIALS & ESTIMATION
[OPEN ELECTIVE]

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To teach the basics involved in selection of good quality building materials for construction
- To give knowledge about various building elements and their specifications
- Presents the basics of planning strategies, building bye laws and acoustics of building
- Preparing tender notice and various approvals needed for a project
- Valuation of building and rent fixation

Course Outcomes

- Students are familiar with various building materials
- Students knows about various building elements and their specifications
- Students are familiar with types of masonry works and bonds used in construction
- Students are capable of understanding building plan and have knowledge about building rules, bye-laws and building elements
- Students will have knowledge about Valuation of building and rent fixation

UNIT – I **(12 Periods)**

Clay bricks: Brick clay, Preparation of bricks, Types of bricks, Dimensions of bricks, Weight of bricks, Storing of bricks, Brick substitutes, Classification of bricks, Tests for bricks.

Timber: Classification of trees, Structure of wood, seasoning and con-version of timber, Market forms of timber, Defects of timber, Treatment of timber, Classification of timber.

Glass: Manufacture and Classification, Treatment of glass, Uses of glass, testing for quality, Characteristics and Performance of glass, Glass fibre.

Plastics: Classification of plastics, Properties of plastics, Fabrication of plastic articles, some plastics in common use, Reinforced plastics.

UNIT – II **(12 Periods)**

Cement: General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, Hydration of cement, heat of hydration, structure of hydrated cement.

Types of Cements: Ordinary Portland cement, low alkali cement, Rapid hardening cement, Sulphate resisting cement, Portland blast furnace slag cement, Portland pozzolana cement, air entraining cement, white cement, hydro phobic cement, oil well cement, low heat Portland cement.

UNIT – III **(12 Periods)**

Building Rules and Bye-Laws: Zoning regulations; Regulations regarding layouts or sub-divisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index.

Building Elements: Conventional signs; Guidelines for staircase planning; Guidelines for selecting doors and windows; Terms used in the construction of door and window; Specifications for the drawing of door and window.

UNIT – IV **(12 Periods)**

Analysis of Rates: Task or out – turn work; Labour and materials required for different works; Rates of materials and labour; Preparing analysis of rates for the following items of work:

i) Concrete ii) RCC Works iii) Brick work in foundation and super structure iv) Plastering v) CC flooring vi) White washing.

PWD Accounts and Procedure of Works : Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

UNIT – V **(12 Periods)**

Valuation: Cost; Price & value; Methods of valuation; Out goings; Depreciation; Methods for Estimating cost depreciation; Valuation of building.

Miscellaneous Topics : Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years

purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage.

Learning Resources:

TextBooks:

1. Estimating & Costing in Civil Engineering by B.N. Dutta; UBS Publishers & Distributors, 2010.
2. Building Materials by P.C. Vergese, 1st Edition, PHI, 2009.
3. Building construction by P.C. Vergese, 1st Edition, PHI, 2009.

Reference Books:

1. Engineering Materials by Rangawala, Charotar Publications, Fortieth Edition: 2013
2. Building construction by BC Punmia et al., 10th Edition,Laxmi Publications, 2008.
3. Building planning, designing and scheduling by Gurucharan Singh,Standard book House, 2006.

Web References:

1. http://nptel.iitm.ac.in/courses.php
2. http://freevideolectures.com/Course/86/Building-Materials-and-Construction
3. http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv053-Page1.htm
4. http://bookmoving.com/register.php?ref=Building%20materials%20rangwala
5. http://bookmoving.com/book/building-materials_654.html

CH 404/A ENERGY ENGINEERING

[OPEN ELECTIVE]

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To provide the knowledge about formation, classification, ranking, analysis, testing, carbonization, gasification and liquefaction of coal, manufacture of cock.
- To provide the knowledge about design, occurrence, composition, classification, exploration and production of petroleum, refining, testing and analysis of petroleum products.
- To provide knowledge about the non -conventional energy resources sun and wind.
- To provide knowledge about the non -conventional energy resources like ocean thermal, geothermal energy, biomass and fuel cells
- To provide knowledge about the energy storage and related problems in the world and its solutions.

Course Outcomes

- An ability to understand the importance of environment and conservation of natural resources.
- An ability to succeed in the competitive exams of energy industry.
- An ability to utilize the non-conventional energies in place of conventional energies and its manufacture.
- An ability to utilize the non- conventional energies in place of conventional energies and its manufacture.
- An ability to maintain the sustainability in the environment

UNIT – I **(12 Periods)**

Conventional energy resources, the present scenario, scope for future development.

Coal: Origin, occurrence and reserves, classification, ranking, analysis and testing, coal carbonization, manufacture of coke, coal gasification, coal liquefaction.

UNIT – II **(12 Periods)**

Petroleum: Origin, occurrence and reserves, composition, classification, characteristics, explorationand production-.

Petroleum Refining:, petroleum products, testing and analysis of petroleum products, Refinery processes- Distillation, cracking, reforming and alkylation, polymerization& isomerization .

UNIT – III **(12 Periods)**

Non- conventional energy sources:

Solar energy: Solar energy, solar radiation, solar collectors- flat plate, concentrating (focusing and non- focusing)collectors , principles of heating and cooling, photo voltaic cells.

Wind energy: Basic principles, basic components, classification of WECS, types of wind machines(horizontal, vertical axis machines) Wind energy conversion systems- horizontal and vertical systems. Applications.

UNIT – IV **(12 Periods)**

Non- conventional energy sources:

Ocean thermal energy - introduction, OTEC (Closed and open OTEC cycles),applications. Geothermal energy- introduction, sources, hydrothermal resources (Liquid and vapor dominated systems), applications.

Bio-mass energy- Introduction, conversion techniques, classification and Types of biogas plants, Hydrogen energy- Introduction,hydrogen production,storage and applications. Fuel cells-introduction, classification, types, advantages and applications.

UNIT – V **(12 Periods)**

Energy storage: introduction, storage systems. Mechanical energy storage- pumped hydroelectric, compressed air, fly wheel storage. Electrical storage- lead acid battery. Chemical storage- via hydrogen, ammonia, chemical reactions.Thermal energy storage- latent ,sensible heat storage. Solar pond

Energy Conservation: Conservation methods in process industries, Theoretical analysis, practical limitations, equipment for energy saving / recovery- recuperators, regenerators, pipes and pumps.

Learning Resources:

Text Books:

1. Non-conventional energy resources by G. D. Rai, Khanna Publishers(2004)
2. Engineering chemistry by Jain& Jain 15 th edition

Reference Books:

1. Conventional Energy technology by S.B.Pandy, Tata McGraw Hill (1987)
2. Elements of Fuels ,furnaces and refractories O.P.Gupta , Khanna publishers(2000)

CH 404/B BIO - FUELS

[OPEN ELECTIVE]

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To provide the knowledge about properties, composition, features of bio fuels and uses of biomass and their environmental impacts.
- To provide the students a substantial knowledge of bio fuel production technologies.
- To provide knowledge about the process of biogas production and methods of production of biodiesel and comparison of the standards to the conventional diesel.
- To provide knowledge about the production of lipids, bio hydrogen from different bacteria and algae.
- To provide knowledge about the fuel cell technology

Course Outcomes

- An ability to describe the functional principle of biofuel technologies in small and large scale.
- An ability to describe the main steps and components in bioethanol, biodiesel and biogas production.
- An ability to Participate actively in teamwork and work with case related problem solving.
- An ability to work with professional problem solving in an industrial environment.
- An ability to work in other fields of engineering.

UNIT - I **(12 Periods)**

Types of biomass (e.g. wood waste, forestry residues, agricultural residues, perennial annual crops, organic municipal solid waste). Composition of lignocelluloses (lignin, hemi cellulose, cellulose); energy crops; chemical pretreatment; enzymatic pretreatment; degradation of cellulose; trichodermacellulases; bacterial cellulases; and comparison with degradation of high starch crops.

Sources of energy, introduction of biofuels, availability of bio mass, composition of biomass, terrestrial biomass, aquatic biomass. Physical and chemical properties of biomass. Useful and undesirable features of biofuels.

UNIT - II **(12 Periods)**

Biogas: The substrate, the digester, the microorganisms, the process of bio gas production, factors affecting bio gas yields, advantages, disadvantages.

Bioethanol: Bioethanol vs. Petrol, production of bio ethanol, ethanol recovery.Bio butanol.Properties and standards of bioethanol. Lignocellulosic biomass composition and characterizations.

UNIT - III **(12 Periods)**

Sources and processing of biodiesel (fatty acid methyl ester); nature of lipids, especially fatty acids and triglycerides. Sources and characteristics of lipids for use as biodiesel feedstock; and conversion of feedstock into biodiesel (transesterification). Use of vegetable oil (SVO) and waste vegetable oil (WVO).

Engineering, economics and environmental issues of biodiesel; major policies and regulations pertaining to the production, distribution, and use of biodiesel. Comparison of bio diesel with conventional diesel. Standards of bio diesel, current technologies and challenges.

UNIT - IV **(12 Periods)**

Hydrogen Production - Direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production - Storage of Hydrogen - Gaseous, Cryogenic and Metal hydride –

Bio hydrogen: Production of bio hydrogen from anaerobic bacteria, photosynthetic algae, photosynthetic–hydrogenase system. Pyrolysis, bio-oil upgradation.

UNIT – V **(12 Periods)**

Fuel cells: Enzymatic fuel cells, microbial fuel cells. Fuel Cell – Principle of working, construction and applications.

Fuels for Fuel Cells: Hydrogen, Hydrocarbon fuels, effect of impurities such as CO, S and others.

Learning Resources:

Text Book:

1. Robert C. Brown, “Biorenewable Resources: Engineering,” New Products from Agriculture, Wiley-Blackwell Publishing, 2003

Reference Books:

1. Samir K. Khanal, “Anaerobic Biotechnology for Bioenergy Production: Principles and Applications,” Wiley-Blackwell Publishing 2008
2. Martin Kaltschmitt; Hermann Hofbauer.“Biomass Conversion and Biorefinery,” Springer Publishing, 2008.

EC-404/A APPLIED ELECTRONICS (OPEN ELECTIVE)

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To understand about various modern electronic systems.
- To provide clear explanation of the operation of all the important electronic devices and systems available.
- To know about modern audio and video systems.
- To know about various Telecommunication Systems

Course Outcomes

- Able to understand the working, types and applications of microphones and loudspeakers.
- Able to understand the features of commercial, theatre sound recording and colour TV standards
- Able to understand the working of various electronic systems, telecommunication and switching systems.
- Able to understand the working of various applications like digital clocks, fiber optics, microprocessor and mobile radio systems.
- Able to understand consumer electronic equipment and systems like washing machines

UNIT – I **(12 Periods)**

Microphones: Characteristics of microphones, Types: Carbon microphones, moving coil microphones, ribbon microphones, electret microphones and wireless microphones.**Headphones:**Headphones and Headsets, Types of headphones.

Loud Speakers: Ideal loudspeaker, **Types:** Crystal loudspeaker, electrostatic loudspeaker, permanent magnet loudspeaker,

High frequency loudspeakers: Horn type tweeters, **Equalizers and Mixers.**

UNIT – II (12 Periods)

Commercial Sound: Recording, manual synthesizer, programmed synthesizer, public address systems, speaker matching systems, PA-system characteristics.**Theatre Sound System**,

Color TV standards and Systems: Primary and secondary colors, Luminance signal, Chrominance signal, color TV camera tube, color TV picture tube, NTSC system PAL system SECAM system

UNIT – III (12 Periods)

Audio systems, Video Systems, Remote Controls, Modulation Techniques, Carrier Systems, Telecommunications Systems: telephone receivers and handsets, signaling-CCITT NO&, modes of operation, **Switching Systems**: principle, Read relay and cross bar switching, PBX switching, stored program control.

UNIT – IV (12 Periods)

Fiber Optics, Data Services, digital clocks, microprocessor, microcontroller, Mobile radio systems: wireless local loop (WLL), role of WLL, radio paging service, digital cellular block diagram, establishing a call, **Fascimile (FAX).**

UNIT – V (12 Periods)

IN-CAR Computers: Electronic ignition, electronic ignition lock systems, ABS, Electronically controlled suspension (ECS), instrument panel display air-bag system. **Washing machines:** Electronic controller for washing machine, washing machine

hardware, washing cycle, software and hardware development, **refrigeration systems.**

Learning Resources:

Text Book:

1. S.P.Bali-Consumer Electronics-Pearson Education, ISBN: 9788131717592, first impression-2008.

Reference Books:

1. Philip Herbert Hoff –Consumer Electronics for Engineers – Cambridge University press (July 28, 1998), ISBN-10: 0521582075
2. RonaldJurgen –Digital Consumer Electronics Handbook – (Editor) by McGraw Hill Professional Publishing, 1997 .ISBN-10: 0070341435

Web Resources:

1. "http://www.newagepublishers.com/samplechapter/000969.pdf"
2. "http://www.bits-pilani.ac.in:12354/qp1-9-10/EEE_C414_851_C_2009_1.pdf"
3. "http://nptel.iitm.ac.in/"

EC-404/B BASIC COMMUNICATION (OPEN ELECTIVE)

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To understand an overview of communication systems.
- To understand the modulation technique, need of modulation, Amplitude modulation.
- To understand fundamentals of digital communications.
- To understand broadband communication systems and Television fundamentals.

Course Outcomes

- Able to understand transmission of analog signals using amplitude modulation.
- Able to understand transmission of digital signals through PCM, PAM, PPM and DELTA.
- Modulation techniques.
- Able to know about various Broad band communication systems.
- Able to know about the monochrome and color Television fundamentals.
- Able to know about Optical communication systems.

UNIT – I **(12 Periods)**

Communications: Communications systems, Information, Transmitter, Channel, Noise, Receiver, Modulation, Description, Need for modulation, Bandwidth Requirements.

Amplitude Modulation: Amplitude Modulation Theory, Frequency spectrum of the AM wave, Representation of AM, Power relations in the AM wave, **Generation of AM,** Basic

requirements, comparison of levels, Grid modulated class C amplifier, Plat modulated class C amplifier, Modulated transistor amplifiers

UNIT – II **(12 Periods)**

Digital Communications: Digital Technology, digital fundamentals, sampling theorem, aliasing effect, pulse amplitude modulation(PAM),synchronization in PAM systems, pulse time modulation, spectra of PDM systems, Elements of pulse code modulation(PCM),sampling and quantization, encoding, regeneration, decoding, DPCM, delta modulation.

UNIT – III **(12 Periods)**

Broadband Communications Systems: Multiplexing, Frequency division multiplex, Time-division multiplex, **Short and Medium Haul Systems:** Co-axial Cables, Fiber optic links, Microwave links, **Long Haul Systems:** Satellite Communications, **Elements of Long-Distance Telephony,** Routing codes and signaling systems, Telephone exchanges (switches) and routing.

UNIT – IV **(12 Periods)**

FUNDAMENTALS OF TELEVISION

Television Fundamentals: TV transmitter and receivers, synchronization, image continuity,

Interlaced scanning, flicker, picture resolution, horizontal and vertical sync details, number of scanning lines, scanning sequence details.

Essentials of color television: Color perception, three color theory, luminance, hue, saturation, color difference signals

UNIT – V **(12 Periods)**

OPTICAL COMMUNICATIONS

History and development, nature of light**:**reflection, refraction, dispersion, diffraction, absorption, scattering, Optical fiber losses, fiber cables, types of fibers.

Learning Resources:

Text Books:

1. George Kennedy-Electronic Communication Systems –Tata McGraw-Hill Publishing, 5thEdition, 2011.
2. Simon HykinS, Communication Systems, 2nd Edition-reprint 2010
3. R.R.Gulati-Modern Television Practice –Principles, Technology and Service –New Age International Publication, 2009.

Reference Books:

1. Simon HykinS-Introduction to Analog and Digital Communication.2007
2. John M Senior-Optical Fiber Communications –An imprint of Pearson Education-3rd Edition-2009.

Web Resources:

1. http://web.engr.oregonstate.edu/~magana/ECE461-561/index.html
2. http://www.ensc.sfu.ca/~jiel/courses/327/index.html
3. http://www.ece.utah.edu/~npatwari/ece5520/lectureAll.pdf
4. http://nptel:iitm.ac.in/syllabus/sylabus.php?subjectId=117105077

EE 404/A NON-CONVENTIONAL ENERGY SOURCES (Open Elective)

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To know the depletion rate of conventional energy resources and importance of renewable energy resources.
- To know the importance of Energy Storage Devices.
- To know alternate viable energy sources to meet the energy requirements.
- To discuss about solar energy, wind energy, tidal energy and geothermal energy as alternate resources.

Course Outcomes

At the end of the course, students will be able to

- know the national scene of energy production, utilization, consumption and energy storage systems.
- know about the basics of solar energy, collectors & generation of electricity from solar energy &photovoltaic's.
- know the assessment of wind energy potential, wind turbines and wind generators.
- know about ocean energy, temperature differences & principles, extraction of energy from waves.
- know about geothermal, types & how biogas is produced & digester for power generation.

UNIT – I **(12 Periods)**

Principle of Renewable Energy: Comparison of renewable and conventional energy sources - Ultimate energy sources - natural energy currents on earth - primary supply to end use - Spaghetti & Pie diagrams - energy planning - energy efficiency and management.

Energy Storage Systems: Pumped Hydro- Compressed air storage-Energy storage by fly wheels-Electrical battery storage-Thermal sensible energy storage-Latent heat energy storage.

UNIT – II **(12 Periods)**

Solar Energy: Extra terrestrial solar radiation - terrestrial solar radiation - solar thermal conversion-solar thermal central receiver systems, Solar pond, Distributed systems.

Photovoltaic's: Photovoltaic energy conversion - solar cell-Construction- conversion efficiency & output-VI characteristics.

UNIT - III **(12 Periods)**

Wind energy: Planetary and local winds - vertical axis and horizontal axis wind mills.

Principles of wind power: maximum power – actual power - wind turbine operation - electrical generator.

UNIT - IV **(12 Periods)**

Energy from Oceans: Ocean temperature differences - principles of OTEC plant operations.

Wave energy: devices for energy extraction - tides - simple single pool tidal system, two pool tidal system.

UNIT - V **(12 Periods)**

Geothermal Energy: Origin and types: Hydrothermal, Geo-pressurized & Petro thermal.

Bio fuels: Classification – direct combustion for heat and electricity generator - anaerobic digestion for biogas - biogas digester - power generation.

Learning Resources:

Text Books:

1. JohnTwidell& Toney Weir“Renewable Energy Sources” E&F.N. Spon
2. EL-Wakil“Power Plant Technology” McGraw-Hill Publications.

Reference Books:

1. G.D.Rai“Non-Conventional Energy Sources”Khanna Publishers.
2. Abbasi&Abbasi“Renewable Energy Sources” Their impact on global warming and pollution by –PHI.

Web References:

1. http://www.tn.gov.in/spc/tenthplan/CH_11_2.PD
2. http://bieap.gov.in/Nonconventionalenergysources
3. http://www.em-ea.org/Guide%20Books/book4/4.12App%20of%20Non%20conventional

EE 404/B UTILIZATION OF ELECTRICAL ENERGY (Open Elective)

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To know about the different types of lamps & lighting schemes.
- To know about the different types electric heating methods.
- To know the design heating elements such as furnaces and ovens.
- To know to utilize the electrical energy for production of heat and welding process.
- To provide specific knowledge on Principles and characteristics of storage batteries.

Course Outcomes

At the end of the course, students will be able to

- know different types of lamps & lighting schemes.
- know about the different types electric heating methods.
- know the designing of heat elements such as furnaces and ovens.
- know how to utilize the electrical energy for production of heat and welding process.
- gain knowledge on principles and characteristics of storage batteries.

UNIT – I **(12 Periods)**

Illumination:

Introduction- terms used in illumination-laws of illumination-Square law methods of calculation.

Gas discharge lamps - Fluorescent lamps - Arc lamps - Filament lamps -Comparison between filament and fluorescent lamps.

UNIT – II **(12 Periods)**

Lighting schemes & Introduction to Electric heating:

Factory lighting - flood lighting and street lighting-design of lighting schemes-introduction to Compact Fluorescent Lamps.

Introduction-Modes of heat transfer - Stefan's law-Classification of electric heating methods

UNIT – III **(12 Periods)**

Electric Heating element Design and types of furnaces:

Design of heating element -Construction and working of different types of induction furnaces -resistance furnace - arc furnaces.

Dielectric heating, Dipole formation, generation of dielectric heat and applications.

UNIT – IV (12 Periods)

Welding: Introduction- Types of welding - resistance and arc welding -Characteristics of Carbon and metallic arc welding – comparison, welding equipment.

Requirements of good weld, comparisons of A.C and D.C weld(Excluding electronic controls)

UNIT – V (12 Periods)

Storage batteries:

Types of cells. Lead acid cell, Nickel Iron cell, Chemical changes during charging and discharging.Applications-rating-classification-dry cell and wet cells.

Methods of charging & common troubles: Charging and discharging of lead acid cells,-methods of charging lead acid batteries-over discharging common troubles with lead acid batteries and remedies-Nickel cadmium batteries.

Learning Resources:

Text Books:

1. J.B. Gupta -"Utilization Electric Power and Electric Traction", Katson books publishers, Tenth Edition, 2012.
2. Utilization, generation & conservation of electrical energy by Sunil S Rao, Khanna publishers, Sixth Edition, 2005.

Reference Books:

1. Partab H –"Art and Science of Utilization of Electrical Energy", Dhanpat Rai and Sons,

   New Delhi, Second Edition,2009.
2. R.K.Rajput-"Utilization of Electric Power", Laxmi publications Private Limited, Second Edition, 2013.

3. G.C.Garg –"Utilization of Electric Power and Traction", Kanna publishers, Ninth Edition, 2014.

Web Resources:

1. http://nptel.iitm.ac.in/video.php?subjectId=108105060.
2. http://web.mit.edu/lien hard/www/ahttv201.pdf..
3. http://www.comp-as.com/pdf/Article03.pdf.
4. www.srmuniv.ac.in/downloads/welding.doc.
5. http://www.freesunpower.com/batteries.php.
6. http://www.trifield.com/content/fixing-common-static-problems/

ME 404/A ROBOTICS
[OPEN ELECTIVE]

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- To provide an introduction to Robotics and Automation including robot classification, design and selection, analysis and applications in industry.
- To provide information on various types of end effectors, their design, interfacing and selection.
- To provide the details of operations for a variety of sensory devices that are used on robot , the meaning of sensing, classification of sensor, that measure position, velocity & acceleration of robot joint.
- The goal of the course is to familiarize the students with the basic concepts of transformations performed by robot.
- Familiarize students to perform kinematics and to gain knowledge on programming of robots.

Course Outcomes

- Students will be familiarized in basic components of robotics, classification of robots and their applications.
- They will have knowledge on types of robot grippers, their usage and design considerations.
- They attain knowledge on various types of sensory devices their working and applications.
- Students will apply basic transformations related to the movement of manipulator.
- An ability to design a robot mechanism to meet kinematics requirements and to write simple programs

UNIT - I **(12 Periods)**

Basics of Robot: Introduction to Robotics, major component of a robot, robotic like devices, classification of robots - Classification by coordinate system and by control method, Specifications of robots, fixed versus flexible automation.

Applications of robot: Economic analysis, Robot applications in Material Handling, Processing and assembly.

UNIT - II **(12 Periods)**

Robot End Effectors: Introduction, end effectors, interfacing, types of end effectors, grippers and tools.

Selection: Selection and Design Considerations of End effectors, Remote Centre Compliance device.

UNIT - III **(12 Periods)**

Robotic Sensory Devices:

Position Sensors: Objective, Non-optical position sensors - potentiometers, synchros, inductocyn, optical position sensors – opto interrupters, optical encoders (absolute & incremental).

Proximity Sensors: Contact type, non-contact type – inductive, capacitive proximity sensors, optical proximity sensor, and scanning laser proximity sensor.

UNIT - IV **(12 Periods)**

Touch and Slip Sensors: Proximity rod & photo detector tactile sensor, slip sensors - Forced oscillation slip sensor, interrupted type slip sensors.

Transformations: Objectives, homogenous coordinates, basic transformation operations, fixed angle representation, Euler angle representation.

UNIT - V **(12 Periods)**

Forward Kinematics: Forward solution – Denavit Hartenberg procedure. Simple problems involving 2 and 3 DOF manipulators, SCARA manipulator.

Robot Programming: Robot programming Languages – VAL Programming – Motion Commands, Sensor Commands, End effecter commands, and Simple programs.

Learning Resources:

Text Books:

1. Robotic Engineering by Richard D.Klafter, Prentice-Hall of India Pvt Ltd, 2010.
2. Industrial Robotics by Mikell P. Groover, Tata McGraw-Hill Int. Edition 2, 2012.
3. Robotics and Control, R.K. Mittal and I.J. Nagarath, TMH, 2005[4 UNIT- 1st chapter].

Reference Books:

4. Introduction to Robotics: Mechanics And Control, John J.Craig 3rd Edition, Pearson, 2008.
5. Robotics: Control, Sensing, Vision, and Intelligence, K. S. Fu, R. C. Gonzales, and C. S. G. Lee, Tata McGraw-Hill, NY, 2008.
6. Introduction to Robotics: Analysis, Systems, Applications, Saeed B. Niku, Prentice Hall, NJ, 2010.

Web References:

1. http://nptel.iitm.ac.in/courses.php?branch=Mechanical
2. http://academicearth.org/courses/introduction-to-roboticsVideo references:-

ME 404/B OPERATIONS RESEARCH
[OPEN ELECTIVE]

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

- Grasp the methodology of OR problem solving and formulate linear programming problem.
- Develop formulation skills in transportation models and finding solutions.
- Understand the basics in the field of game theory and assignment problems.
- Understand project management techniques.
- Understand dynamic programming and simulation.

Course Outcomes

At the end of the course, students will be able to

- recognize the importance and value of Operations Research and linear programming in solving practical problems in industry.
- interpret the transportation models' solutions and infer solutions to the real-world problems.
- recognize and solve game theory and assignment problems.
- gain knowledge of drawing project networks for quantitative analysis of projects.
- know when simulation and dynamic programming can be applied in real world problems.

UNIT – I **(12 Periods)**

Linear Programming : Definition and Scope of Operations Research, Mathematical formulation of the problem, graphical method, Simplex method, artificial basis technique, dual Simplex method. Degeneracy, alternative optima, unbounded solution, infeasible solution.

UNIT – II **(12 Periods)**

Transportation Problem: Introduction to the problem, LP formulation of a transportation problem. Basic feasible solution by north-west corner method, Vogel's approximation method, least cost method. Finding optimal solution by MODI method, degeneracy, unbalanced transportation problem and Maximization in transportation model.

UNIT – III **(12 Periods)**

Assignment Problem: One to one assignment problem, optimal solutions, unbalanced assignment matrix, travelling sales man problem, maximization in A.P.

Theory of Games: Introduction, rectangular two person zero sum games, solution of rectangular games in terms of mixed strategies, solution of 2x2 games without saddle point, concept of dominance to reduce the given matrix, Graphical method for 2xn and nx2 games.

UNIT – IV **(12 Periods)**

Project Planning through Networks: Introduction, Basic steps in PERT/CPM techniques, Network diagram representation, Rules of drawing network diagram, Fulkerson's rule, Time estimates and Critical path in network analysis, floats, Project evaluation and review technique, Application areas of PERT/CPM techniques.

UNIT – V **(12 Periods)**

Dynamic Programming: Introduction, Characteristics of D.P. model, the recursive equation approach, Computational Procedure in dynamic Programming, solution of an L.P. by D.P

Simulation: Introduction, Monte-Carlo Simulation, Application to Inventory Control, Application to Queuing Problems.

Learning Resources:

Text Books:

1. Operations Research - S.D. Sharma, Kedar nath Ram nath & Co, 2008.
2. Operations Research - Theory and Applications ,J.K Sharma, Macmillan Publications India Ltd, 2013

Reference Books:

1. Operations Research - H.A. Taha , Pearson , 7th Edition, June 2002.
2. Introduction to Operations Research - Hiller and Liberman, MGH, 7th Edition, 2002.

Web References:

1. http://www2.informs.org/Resources/
2. http://www.mit.edu/~orc/
3. http://www.ieor.columbia.edu/
4. http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm
5. http://www.wolfram.com/solutions/OperationsResearch/

IT 405 INTERACTIVE COMPUTER GRAPHICS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, the student will understand

- the functions and operations of display hardware and associated devices.
- algorithms for drawing 2D primitives.
- geometric transformations of 2D and 3D objects.
- design of graphical user interfaces.
- methods for enlarging visible portion of drawing with viewing and clipping techniques.

Course Outcomes

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

- know the functions and operations of display hardware and associated devices.
- draw lines, circles, and ellipse.
- implement polygon fill algorithms and 2D transformations.
- implement 2D clipping and projections.
- Know 3D concepts.
- implement 3D representations and transformations.
- implement 3D clipping and projections

UNIT – I **(15 Periods)**

Introduction : Basic concepts, Application areas of Computer Graphics, overview of graphics systems - video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations, Hard copy devices and Graphics software.

Output primitives: Points and lines, line drawing algorithms – DDA, Bresenham's, mid-point circle and mid-point ellipse algorithms.

UNIT – II **(12 Periods)**

Filled area primitives - Scan line polygon fill algorithm, inside-outside tests, boundary-fill and flood-fill algorithms, character generation and Ant aliasing.

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms.

UNIT – III **(12 Periods)**

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland line clipping algorithm, Sutherland –Hodgeman polygon clipping algorithm.

Three Dimensional Concepts: 3-D Display method, Parallel Projection, Perspective Projection, Depth Cueing, Visible Lines and Surface Identification and Surface Rendering.

UNIT – IV **(12 Periods)**

3-D object representation: Polygon surfaces, Curved lines and surfaces, quadric surfaces, spline representation.

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

UNIT – V **(12 Periods)**

3-D viewing& Clipping: Viewing pipeline, viewing coordinates, projections.
3-D viewing& Clipping: View volume and general projection transforms. Normalized View Volumes, Viewport Clipping, Clipping in Homogeneous coordinates.

Learning Resources:

Text Books:

1. Computer Graphics *C version*, Donald Hearn and M.Pauline Baker, Pearson Education 2nd Edition.

Reference Books:

1. Computer Graphics Principles & Practice, 2nd Edition, James. D. Foley, AndriesVanDam, Steven K.Feiner and Hughes, Pearson Education.
2. Computer Graphics, Steven Harrington, 2nd Edition, TMH
3. Procedural elements for Computer Graphics, David F Rogers, Tata McGrawHill, 2nd edition.
4. Principles of Interactive Computer Graphics, Willam.M.Neuman and Robert.F.Sproul, 2nd edition, TMH.
5. Principles of Computer Graphics, ShaliniGovil, Pai, 2005, Springer.

Web References:

1. http://kat.ph/hearn-baker-computer-graphics-c-version-2nd-ed-t3295235.html
2. http://users.abo.fi/jawester/compgraph/
3. http://research.cs.wisc.edu/graphics/Courses/559-s2002/cs559.html
4. http://www.cs.umd.edu/~mount/427/Lects/427lects.pdf

IT/CS 406 (A) OPEN SOURCE SYSTEMS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- basic concepts of PHP language and developing web applications.
- PHP Browser Handling and form data access.
- creation of database driven web applications.
- Ajax for partial rendering.
- the use of XML and RSS with PHP.

Course Outcomes

At the end of the course the students will be able to

- develop web applications using Apache, PHP, and MySQL and apply the OOP concepts.
- create database driven web applications.
- create powerful web applications using Ajax.
- create images at the web server.
- manipulate XML documents using PHP and CreateRSS.

UNIT – I **(15 Periods)**

Essential PHP.

Operators and Flow Control.

Strings and Arrays.

UNIT – II **(15 Periods)**

Reading Data in Web Pages.

PHP Browser-HANDLING Power.

UNIT – III **(15 Periods)**

Object Oriented Programming.

Advanced Object Oriented Programming.

File Handling.

UNIT – IV **(15 Periods)**

Working with Databases.

Sessions, Cookies, and FTP.

Ajax

UNIT – V **(15 Periods)**

Advanced Ajax.

Drawing Images on the Server.

XML and RSS.

Learning Resources:

Text Book:

1. PHP: The Complete Reference, Steven Holzner, TATA McGraw Hill, 2013.

Reference Books:

1. Beginning PHP and MySQL: From Novice to Professional, By by W. Jason Gilmore, Apress.
2. PHP 6 and MySQL 6 Bible, By Steve Suehring, Tim Converse, Joyce Park, Wiley Publishing, Inc.

IT/CS 406(B) .NET TECHNOLOGIES

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- the C# language and the .NET Framework.
- working of Microsoft Visual Studio Development Environment.
- windows Forms applications with rich, highly responsive user interfaces.
- development of web applications and Services using ASP.NET.
- the use of Language Integrated Query (LINQ).

Course Outcomes

At the end of the course the students will be able to

- apply basic concepts of C# programming.
- apply advanced concepts of C# programming.
- develop and deploy windows applications.
- develop and deploy web applications and web services using ASP.NET.
- develop database driven applications using XML and LINQ.

UNIT – I (15 Periods)

Introducing C#, Writing a C# Program, Variables and Expressions, Flow Control, More About Variables, Functions.

UNIT – II (15 Periods)

Debugging and Error Handling ,Introduction to Object-Oriented Programming, Defining Classes, Defining Class Members, Collections, Comparisons and Conversions.

UNIT – III **(15 Periods)**

Generics, Additional OOP Techniques, Basic Windows Programming, Advanced Windows Forms Features, Deploying Windows Applications

UNIT – IV **(15 Periods)**

ASP.NET Web Programming, Web Services, Deploying Web Applications.

UNIT – V **(15 Periods)**

File System Data, XML, Introduction to LINQ, Applying LINQ.

Learning Resources:

Text Book:

1. BEGINNING VISUAL C# 2010, Karli Watson, Christian Nagel, Jacob Hammer Pedersen, Jon Reid, and Morgan Skinner, Wiley Publishing, Inc**.**

Reference Books:

1. Core C# and .NET, Stephen C. Perry, Pearson Education, 2006.
2. C#: The Complete Reference, Herbert Scheldt, TATA McGraw Hill Publishing.
3. Andrew Troelsen, Pro C# and the .NET Platform, A! Press.
4. Kevin Hoffman, *Microsoft Visual C# 2005 Unleashed.* Sams Pearson India.

IT 406(C) PROGRAMMING WITH PYTHON

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- procedural programming features of python
- object oriented programming features of python
- file handling power of python
- threads and networking support of python
- database and GUI programming in python

Course Outcomes

At the end of the course the students will be able to

- apply procedure oriented features of python
- apply Object oriented programming features of python
- develop applications for manipulating files
- implement threads and network programming
- develop database and GUI programs

UNIT – I **(15 Periods)**

Rapid Introduction to Procedural Programming - Creating and Running Python Programs, Python's "Beautiful Heart, Data Types, Object References, Collection Data Types, Logical Operations,
Control Flow Statements, Arithmetic, Input/Output, Creating and Calling Functions, Examples-bigdigits.py, generate_grid.py,**Data Types -** Identifiers and Keywords, Integral Types, Integers, Booleans, Floating-Point Types, Floating-Point Numbers, Complex Numbers, Decimal, Strings, Comparing Strings, Slicing and Striding Strings, String Operators and Methods, String Formatting with the str.format() Method, Character Encodings, Examples - quadratic.py,csv2html.py.

Collection Data Types - Sequence Types, Tuples, Named Tuples, Lists, Set Types, Sets, Frozen Sets, Mapping Types, Dictionaries, Default Dictionaries, Ordered Dictionaries, Iterating and Copying Collections, Iterators and Iterable Operations and Functions, Copying Collections, Examples - generate_usernames.py, statistics.py.

UNIT – II (15 Periods)

Control Structures and Functions - Control Structures, Conditional Branching, Looping, Exception Handling, Catching and Raising Exceptions, Custom Exceptions, Custom Functions, Names and Docstrings, Argument and Parameter Unpacking, Accessing Variables in the Global Scope, Lambda Functions, Assertions Example - make_html_skeleton.py.

Modules - Modules and Packages, Packages, Custom Modules, Overview of Python's Standard Library, String Handling, Command-Line Programming, Mathematics and Numbers, Times and Dates, Algorithms and Collection Data Types, File Formats, Encodings, and Data Persistence, File, Directory, and Process Handling, Networking and Internet Programming, XML, Other Modules.

UNIT – III (15 Periods)

Object-Oriented Programming - The Object-Oriented Approach, Object-Oriented Concepts and Terminology, Custom Classes, Attributes and Methods, Inheritance and Polymorphism , Using Properties to Control Attribute Access, Creating Complete Fully Integrated Data Types, Custom Collection Classes, Creating Classes That Aggregate Collections, Creating Collection Classes Using Aggregation, Creating Collection Classes Using Inheritance.

File Handling - Writing and Reading Binary Data, Pickles with Optional Compression, Raw Binary Data with Optional Compression, Writing and Parsing Text Files, Writing Text,

Parsing Text, Parsing Text Using Regular Expressions, Writing and Parsing XML Files, Element Trees DOM (Document Object Model) Manually Writing XML,Parsing XML with SAX (Simple API for XML) Random Access Binary Files, A Generic Binary Record File Class Example: The Bike Stock Module's Classes

UNIT – IV **(13 Periods)**

Processes and Threading - Using the Multiprocessing Module, Using the Threading Module, Example: A Threaded Find Word Program, Example: A Threaded Find Duplicate Files Program

Networking - Creating a TCP Client , Creating a TCP Server

UNIT - V **(13 Periods)**

Database Programming - DBM Databases, SQL Databases,
Introduction to GUI Programming - Dialog-Style Programs, Main-Window-Style Programs, Creating a Main Window, Creating a Custom Dialog

Learning Resources:

Text Book:

1.Programming in Python 3 – A complete introduction to the Python Language by Mark Summerfield, 2nd Edition, Addison Wisley,

Reference Books:

1. Beginning python from novice to professional by Magnus Lie Hetlands, 2nd Edition, Apress
2. Learning Python by Mark Lutz, 5th Edition, O'reilly
3. Programming Python by Mark Lutz, 4th Edition, O'reilly

IT 406(D) INTERNET OF THINGS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	1 periods/week	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- basics of IoT and its Market perspective.
- data and Knowledge Management and use of Devices in IoT Technology.
- state of the Art – IoT Architecture.
- real World IoT Design Constraints.

Course Outcomes

At the end of the course the students will be able to

- know the vision and the Market perspective of IoT.
- use of Devices, Gateways and Data Management in IoT.
- build state of the art architecture in IoT.
- develop various Application of IoT in Real World.
- develop various applications for Commercial Building Automation.

UNIT - I **(15 Periods)**

M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.

M2M to IoT – A Market Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging

industrial structure for IoT, The international driven global value chain and global information monopolies.

UNIT - II **(15 Periods)**

M2M to IoT-An Architectural Overview– Building architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

UNIT – III **(15 Periods)**

IoT Architecture-State of the Art – Introduction, State of the art,**Architecture Reference Model-** Introduction, Reference Model and architecture, IoT reference Model

IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT – IV **(15 Periods)**

Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control

Industrial Automation- Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things.

UNIT – V **(15 Periods)**

Commercial Building Automation- Introduction, Case study: phase one-commercial building automation today,

Commercial Building Automation- Case study: phase two-commercial building automation in the future.

Learning Resources:

Textbook:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

Reference Books:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1stEdition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

IT 451 MINI PROJECT /TERM PAPER

Practicals	:	3 periods/week	Sessional Marks	:	100
			Sem. End Exam Marks	:	---
External Exam	:	---	Credits	:	**2**

Course Objectives

At the end of the course, students will understand

- To build Confidence in understanding the current technologies.
- Identification of the field of interest.
- To prepare the graduate to express the knowledge they have gained in the related areas.

Course Outcomes

At the end of the course the students will be able to

- identify a technical problem and mingle with the latest developments in the selected area.
- develop/study a prototype.
- develop solution to the selected problem.
- prepare a technical report.

It is aimed as a precursor to the project work done in the second semester of the final year B.Tech. It should help the students to identify their research area / topic and should form the groundwork and preliminary research required for the project work.

The batches formed for pursuing the Project Work in the Final Year shall select some research paper published in the referred journals/identify new problems. The batch must gain an understanding of the research tools used and the related material, available both in printed and digital formats. Each individual of the project batch must make the presentation for two rounds on the same research paper about their understanding, conclusion and if possible propose the

extensions for the work. At the end of the Semester, the batch must submit a detailed report.

Evaluation is to be done for the two presentations made and the report submitted.

Method of Evaluation:

1. Day to day work	-	20 marks
2. Seminar – I	-	30 marks
3. Seminar – II	-	30 marks
4. Term Paper/Mini Project Report	-	20 marks
TOTAL	-	100 marks

Note: There is no semester end examination.

IT 452 WEB SERVICES LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- J2EE Multi-Tire architecture.
- server side scripting with Java Server Pages.
- XML parsers and Enterprise Java beans.
- RMI, Java Mail and Corba.
- webservices and its related technologies.

Course Outcomes

At the end of the course the students will be able to

- design dynamic web pages with JSP.
- develop DOM and SAX parsers.
- create Enterprise Java Beans.
- use Java Mail, RMI and Corba in real time web applications.
- create and consume Web Services.

Lab Cycle

1. Write a program to Integrate JSP & Servlets.
2. Write an application using JSP Technology.
3. Write a program to demonstrate Java Bean using JSP Implicit objects.
4. Write a program to demonstrate cookie & Sessions using JSP.
5. Write a program to demonstrate Statefull/Stateless Session Bean.

6. Write a program to demonstrate XML SAX Parser.
7. Write a program to demonstrate XML DOM Parser.
8. Write a program to demonstrate Java Mail.
9. Write a program to demonstrate Remote Method Invocation.
10. Write a program to demonstrate CORBA using Java IDL.
11. Develop an application for Client Request / Responses using SOAP.
12. Demonstrate how to describe web services.

IT 453 (A) OPEN SOURCE SYSTEMS LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- basic concepts of PHP language and developing web applications.
- PHP Browser Handling and form data access.
- creation of database driven web applications.
- Ajax for partial rendering.
- the use of XML and RSS with PHP.

Course Outcomes

At the end of the course the students will be able to

- develop web applications using Apache, PHP, and MySQL and apply the OOP concepts.
- create database driven web applications.
- create powerful web applications using Ajax.
- create images at the web server.
- Manipulate XML documents using PHP and Create RSS.

Lab Cycle

1. Demonstrate the configuration of Apache, MySQL and PHP.
2. Write PHP Script to demonstrate String processing and regular Expressions in PHP.
3. Program to demonstrate Reading Data in Web Pages.
4. Program to demonstrate PHP Browser-Handling power.
5. Program to demonstrate File Uploading.
6. Program to demonstrate Object Oriented features of PHP.

7. Program to demonstrate Advanced Object Oriented features of PHP.
8. Program to demonstrate File Handling.
9. Write Script that takes user input data and validates it and write the data into the database.
10. Program to demonstrate DML commands in MySQL.
11. Program to demonstrate Passing of Information between Web pages using Sessions.
12. Program to demonstrate the use of Cookies.
13. Program to demonstrate FTP.
14. Program to demonstrate Ajax.
15. Program to demonstrate Advanced Ajax.
16. Program to demonstrate Drawing Images on the Server.
17. Program to create RSS feeds using PHP.
18. Program to manipulate XML documents using PHP.
19. Program to demonstrate user management and authentication.

IT 453 (B) .NET TECHNOLOGIES LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- the C# language and the .NET Framework.
- working of Microsoft Visual Studio Development Environment.
- windows Forms applications with rich, highly responsive user interfaces.
- development of web applications and Services using ASP.NET.
- the use of Language Integrated Query (LINQ).

Course Outcomes

At the end of the course the students will be able to

- apply basic concepts of C# programming.
- apply advanced concepts of C# programming.
- develop and deploy windows applications.
- develop and deploy web applications and web services using ASP.NET.
- develop database driven applications using XML and LINQ.

Lab Cycle

1. Write a program to demonstrate OOPs concepts in C#.
2. Write a program to demonstrate Exception handling in C#.
3. Write a program to illustrate the concepts of events & delegates in C#.
4. Write a program to demonstrate multi-threaded programming in C#.

5. Write a program to demonstrate generics.
6. Write a program to demonstrate StreamWriters and StreamReaders.
7. Write a program to demonstrate Building and consuming a multi file assembly.
8. Write a program to demonstrate DML and DDL Commands using ADO.NET.
9. Write a program to build a data driven ASP.NET Web application.
10. Write a program to demonstrate ASP.NET controls.
11. Write a program to demonstrate Windows Forms Controls.
12. Write a program to demonstrate the building of a simple Windows Forms Application.

IT 453 (C) PROGRAMMING WITH PYTHON LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- procedural programming features of Python
- object oriented programming features of Python
- file handling power of Python
- threads and networking support of Python
- database and GUI programming in Python

Course Outcomes

At the end of the course the students will be able to

- apply procedure oriented features of Python
- apply Object oriented programming features of Python
- develop applications for manipulating files
- implement threads and network programming
- develop database and GUI programs

Write Algorithms and Python Programs for the following

1. To demonstrate control structures.
2. To demonstrate functions.
3. To demonstrate creation of a module.
4. To demonstrate OOPS concepts.
5. To demonstrate file handling.
6. To demonstrate XML document manipulation.
7. To demonstrate threads.
8. To demonstrate TCP client/server.
9. To demonstrate database interaction.
10. To demonstrate GUI programming.

IT 453 (D) INTERNET OF THINGS LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course the students will understand

- state of the art – IoT architecture.
- real world application design in IoT.

Course Outcomes

At the end of the course the students will be able to

- build state of the art architecture in IoT.
- develop various Application of IoT in Real World.

Lab Cycle

Building functional requirement specification, design, implement and deployment of the following applications.

1. Smart lighting
2. Home Intrusion detection
3. Smart Parking
4. Weather monitoring
5. Air pollution monitoring
6. Smart Irrigation

IT/CS 407
INDUSTRIAL ENGINEERING & MANAGEMENT

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, students will understand

- General Management Concepts and Forms of Business Organization.
- Financial Management, economicevaluation and depreciation.
- Human Resource Management.
- Material Management.
- Marketing Management.

Course Outcomes

At the end of the course, students will be able to

- Know General Management Concepts and Forms of Business Organization.
- Familiarize with Financial Management, economicevaluation and depreciation.
- Know Human Resource Management.
- Identify Material Management.
- Familiarize with Marketing Management.

UNIT – I **(12 Periods)**

General Management: Management Concept, Managerial Roles, Managerial Skills, Brief treatment of managerial functions, Scientific Principles of Management, Administrative Principles of Management.

Forms Of Business Organisation: Salient features of sole proprietorship. Partnership, Joint Stock Company, Private limited and Public limited companies.

UNIT – II **(14 Periods)**

Financial Management: Objectives of Financial Management, Concept of interest, compound interest, and equivalent cash flow diagram

Economic Evaluation of Alternatives: Basic methods, the annual equivalent method, present worth method, future worth method.

Depreciation: Purpose, types of depreciation, common methods of depreciation. The straight line method, declining balance method, the sum of the year's digits method.

UNIT – III **(14 Periods)**

Human Resource Management: Functions of Human Resource Management – Job Analysis, Human Resources Planning, Brief treatment of Recruitment, Selection, Placement, Induction & Orientation, Training and Development, Performance Appraisal, Job Evaluation, Career Planning and Development, Stress Management, Compensation.

Directing: Motivation and Leadership, Theories of motivation and styles of Leadership.

UNIT – IV **(10 Periods)**

Material Management: Functions of Materials Management, Material Requirement Planning, Purchasing, Objectives of Purchasing, Source Selection, Procurement Methods, Vendor Rating, Inventory Management –EOQ, EPQ, ABC Analysis, FSN Analysis, VED Analysis.

UNIT – V **(10 Periods)**

Marketing Management: Functions of Marketing, Marketing Mix, Product life cycle, Channels of distribution, Marketing Segmentation, Advertising & Sales promotion, Market Research.

Learning Resources:

Text Books:

1. KK Ahuja, Industrial Management, Vol. I & II, Dhanpat Rai, 1978. (UNIT-I to UNIT-V)
2. E.Paul Degarmo, John R Chanda, William G Sullivan, Engineering Economy, Mac Millan Publishing Co, 1979. (UNIT-II)

Reference Books:

1. Philip Kotler, Marketing Management, 11th Edition, Pearson Education, 2004.
2. P. Gopalakrishnan, Hand Book of Materials Management, PHI, 1999.
3. Gary Dessler, Human Resource Management,11th Edition,2008.
4. Heinz Weirich and Harold Koontz, Management, 10th Edition, TMH, 2004.

Web References:

1. www.managementstudyguide.com: Describes the Concepts of Management &Its Operational Functions.
2. www.1000ventures.com: Describes about Management Gurus, Business Gurus.

IT 408 DISTRIBUTED AND CLOUD COMPUTING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- distributed and Cloud Computing concepts.
- the concept of Virtualizations used in Distributed Computing.
- distributed Computing in Data Modalities.
- security issues in Cloud Computing.

Course Outcomes

At the end of the course the students will be able to

- address the core issues of distributed and cloud computing.
- know the concepts of massive parallelism.
- know the virtualization issues related to the clusters and data centers.
- provide appropriate cloud computing solutions and recommendations according to the applications used.
- familiarize with enabling technologies of Internet of Things.

UNIT – I **(15 Periods)**

Distributed System Models And Enabling Technologies: Scalable Computing Over the Internet, Technologies For The Network Based Systems.

Distributed System Models And Enabling Technologies: System Models For Distributed and cloud Computing, Software Environments For Distributed Systems and Clouds.

UNIT – II **(15 Periods)**

Computer Clusters for Scalable Parallel Computing: Clustering For Massive Parallelism, Computer Clusters and MPP Architectures.

Computer Clusters for Scalable Parallel Computing: Design Principles Of Computer Clusters, Clusters Job and Resource Management.

UNIT – III **(15 Periods)**

Virtual Machines and Virtualization of Clusters and Data Centers: Implementation levels Of Virtualization, Virtualization Structure/tools and Mechanisms.

Virtual Machines and Virtualization of Clusters and Data Centers: Virtualization Of CPU, Memory, and I/O Devices.

UNIT – IV **(15 Periods)**

Computing Clouds Service Oriented Architecture and Programming:

Cloud Computing and Service Models, Data-Center Design and Interconnection Networks, architecture Design of Compute and Storage Clouds.

Computing Clouds Service Oriented Architecture and Programming:

Public Cloud Platforms: GAE, AWS, and Azure, Inter-Cloud Resource Management.

UNIT – V **(15 Periods)**

Cloud Programming and Software Environments: Parallel and Distributed Programming Paradigms, Programming Support of Google App Engine, Programming On Amazon AWS and Microsoft Azure.

Cloud Programming and Software Environments: Emerging Cloud Software Environments, Enabling Technologies for the Internet of Things.

Learning Resources:

Textbook:

1. Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, Kai Hwang, Geoffrey C. Fox, J.J. Dongarra, 2013.

Reference Books:

1. Enterprise Cloud Computing, Technology, Architecture, Applications, Gautam Shroff, Cambridge, 2010.
2. Handbook of Cloud Computing, Borko Furht-Armanndo Escalante, Springer, 2010.

IT/CS 409 (A) PARALLEL ALGORITHMS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- parallel and distributed algorithms development techniques for shared memory and message passing models.
- various models of parallel algorithms.
- the complexity and correctness models for parallel algorithms.

Course Out Comes

At the end of the course the students will be able to

- knowmassive parallelism on large-scale and model parallel programs for Selection and merging.
- analyze and model parallel programs sorting and searching.
- analyze and model parallel programs for permutation, Combination and Matrix .
- analyze and model parallel programs for Graph algorithms and applications.
- analyze and model parallel programs for Computing Prefix Sums and Applications**.**

UNIT – I **(12 Periods)**

Introduction to Parallel Algorithms: Models of Computation – Analyzing Algorithms, Selection-The Problem and a lower Bound, A Sequential algorithm, Desirable Properties of Parallel algorithm, An algorithm for parallel Selection.

Merging: A Network for Merging, Merging on the CREW and EREW Models – A better Algorithm for the EREW model,

UNIT – II **(12 Periods)**

Sorting: A network for Sorting, Sorting on a Linear Array, Sorting on CRCW, CREW, EREW Models

Searching: Searching a Sorted Sequence – Searching a Random Sequence, Searching on a tree, searching on Mesh.

UNIT – III **(12 Periods)**

Generating Permutations and Combinations: Sequential Algorithms, generating permutations in Parallel, generating combinations in Parallel.

Matrix Operations: Transpositions, Matrix by Matrix Multiplications, Matrix by Vector multiplication.

UNIT – IV **(12 Periods)**

Connectivity Matrix: Computing the Connectivity Matrix, Finding Connected Components.

All Pairs Shortest Paths: Computing Minimum Spanning Trees.

UNIT – V **(12 Periods)**

Computing Prefix Sums: A Specialized Network, Using the un-shuffle Connection, Prefix Sums on a Tree, Prefix Sums on a Mesh

Applications: Job Sequencing with Deadlines, Knapsack Problem, Mesh Solutions

Learning Resources:

Text Books:

1. Selim G. Akl, The Design and Analysis of Parallel Algorithms, Prentice Hall, New Jersey, 1989

Reference Books:

1. Michael J. Quinn, Parallel Computing: Theory & Practice, Tata McGraw Hill Edition, 2003.
2. Justin R. Smith, the Design and Analysis of Parallel Algorithms, Oxford University Press, USA, 1993.
3. Joseph JaJa, Introduction to Parallel Algorithms, Addison-Wesley, 1992.

IT/CS 409 (B) DIGITAL IMAGE PROCESSING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- basics of digital image processing.
- image enhancement techniques in spatial and frequency domains.
- concepts of Image restoration.
- mechanisms for advanced image analysis.

Course Outcomes

At the end of the course the students will be able to

- familiarize with fundamentals of digital image processing.
- apply techniques of smoothening and sharpening in spatial and frequency domain.
- use restoration techniques.
- develop image compression techniques using standard algorithms to meet design specifications.
- know Morphological processing and Image segmentation techniques.

UNIT – I **(12 Periods)**

Introduction: Digital Image Processing, Fundamental Steps in Digital Image Processing, Components of Image Processing.

Digital Image Fundamentals: Image Sensing and Acquisition, Image Sampling and Quantization, Some basic Relationships between Pixels.

UNIT – II **(14 Periods)**

Intensity Transformations and Spatial Filtering: Some Basic Intensity Transformation Functions, Histogram Processing,Fundamentals of Spatial Filtering, Smoothing spatial Filters, Sharpening spatial Filters.

Filtering in the Frequency Domain: Properties of the 2-D Discrete Fourier Transform,

The Basics of Filtering in the Frequency Domain, Image Smoothing Using Frequency Domain Filters, Image Sharpening Using Frequency Domain Filters.

UNIT – III **(12 Periods)**

Image Restoration: A Model of the Image Degradation/Restoration Process, Noise models, Restoration in the presence of noise only- Spatial Filtering, Periodic Noise Reduction by Frequency Domain filtering.

Image Restoration: Linear, Position-Invariant Degradations, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering.

UNIT – IV **(12 Periods)**

Image Compression: Fundamentals:- Coding Redundancy, Spatial and Temporal Redundancy, Irrelavant Information, Measuring Image Information, Fidelity Criteria, Image Compression Models, Image Formats, Containers and Compresssion Standards.

Image Compression: Some Basic Compression Methods:- Huffman Coding, Arithmetic Coding, LZW Coding, Run-Length Coding, Bit-Plane Coding, Block Transform Coding, Predictive Coding.

UNIT – V **(14 Periods)**

Morphological Image Processing: Erosion and Dilation, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms, Gray-Scale Morphology.

Image Segmentation: Fundamentals, Point, Line and Edge Detection, Thresholding, Region-Based Segmentation.

Learning Resources:

Text Book:

1. Rafael C. Gonzalez, Richard E. Woods, 'Digital Image Processing' Pearson Education, 3rd Edition.

Reference Books:

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, 'Image Processing, Analysis, and Machine Vision', 3rd Edition.
2. A.K.Jain, 'Fundamentals of Digital Image Processing' PHI.

IT 409(C) NATURAL LANGUAGE PROCESSING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course, students will understand

- the basic concepts of natural language processing.
- the computational models for enabling effective natural language processing.

Course Outcomes

At the end of the course, students will be able to

- know the applications of natural language processing.
- knowthe structural components of sentences for a given Grammar.
- represents context-independent meaning of a sentence.
- link logical forms with syntactic structures for semantic interpretation of the sentence.
- generate contextual representation.

UNIT – I **(12 Periods)**

Introduction to Natural Language Understanding: Applications of Natural Language Understanding, Evaluating language Understanding Systems, The Different levels of Language Analysis.

Grammars and Parsing: Grammars and Sentence Structure, Top- down parser, Bottom up chart parser, Transition network grammars, Top-down chart parsing, Finite state models and Morphological processing.

UNIT – II **(12 Periods)**

Features and Augmented Grammars: Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, A Simple Grammar Using Features, Parsing with Features, Augmented Transition Networks.

Grammars for Natural Language: Auxiliary Verbs and Verb Phrases, Movement Phenomenon in Language, Handling Questions in Context-Free Grammars.

UNIT – III **(12 Periods)**

Toward Efficient Parsing: Human preferences in parsing, Encoding Uncertainty-Shift-Reduce Parsers, A Deterministic Parser. **Ambiguity Resolution:** Statistical Methods: Part of Speech tagging, Obtaining lexical probabilities, Probabilistic Context-Free Grammars, Best-First Parsing.

Semantics and logical Form: Semantics and Logical Form ,Word Senses and Ambiguity, The Basic Logical Form Language, Encoding Ambiguity in the Logical Form, Verbs and States in Logical Form.

UNIT – IV **(12 Periods)**

Linking Syntax and Semantics: Semantic Interpretation and Compositionality, A Simple grammar and Lexicon with Semantic Interpretation, Prepositional Phrases and Verb Phrases.

Ambiguity Resolution: Selectional Restrictions, Semantic Filtering Using Selectional Restrictions, Statistical Word Sense Disambiguation. **Scoping and the Interpretation of Noun Phrases:** Scoping Phenomena, Definite Descriptions and Scoping.

UNIT – V **(12 Periods)**

Using World Knowledge: Using world knowledge: Establishing Coherence, Matching against Expectations, Reference and Matching Expectations, Using Knowledge About Action and Casuality, Scripts: Understanding Stereotypical Situations

Discourse Structure: The Need for Discourse Structure, Segmentation and Cue Phrases, Discourse Structure and Reference, Relating Discourse Structure and Inference, Discourse Structure, Tense and Aspect, Managing the Attentional stack.

Learning Resources:

Text Book:

1. James Allen, Natural Language Understanding, Second Edition, Pearson Education.

Reference Books:

1. Daniel Jurafsky, James H.Martin, Speech and Language Processing.
2. Christopher Manning, HinrichSchutze, Foundations of Statistical Natural Language Processing, MIT Press.
3. Elaine Rich and Kevin Knight, Artificial Intelligence, Second Edition, Tata McGraw Hill.

Web References:

1. www.pcai.com/web/ai_info/natural_lang_proc.html

2. https://en.wikipedia.org/wiki/Natural_language_processing

IT 409 (D) CYBER SECURITY

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- fundamentals of information security and threats, data leakage & prevention.
- cyber security policies and Evolutions.
- cyber security objectives and decision makers.
- cyber governance issues.
- cyber management issues.

Course Outcomes

At the end of the course the students will be able to

- identify common security vulnerabilities/attacks, principles and concepts, Data protection and content analysis techniques.
- know polices, laws & regulations and counter measures.
- know the concepts of security frameworks, security policy objectives and security documentation.
- analyze copyright & Trademarks, cyber user issues and conflict issues.
- analyze risk management in various sectors and data backup procedures.

UNIT – I **(12 Periods)**

Information Security and Threats: Information Security, Information Assets, Threats to Information Assets.

Fundamentals of Information Security: Elements of information security, Principles and concepts – data security, Types of controls.

Data Leakage: Introduction – Data Leakage, Organisational Data Classification, Location and Pathways, Content Awareness, Content Analysis Techniques, Data Protection, DLP Limitations, DRM-DLP Conundrum.

UNIT – II **(12 Periods)**

Cyber Security Introduction: Cyber Security, Cyber Security policy, Domains of Cyber Security Policy: Laws and Regulations, Enterprise Policy, Technology Operations, Technology Configuration, Strategy Versus Policy.

Cyber Security Evolution: Productivity, Internet, e-commerce, Counter Measures, Challenges.

UNIT – III **(12 Periods)**

Cyber Security Objectives: Cyber Security Metrics, Security Management Goals, Counting Vulnerabilities, Security Frameworks, Security Policy Objectives.

Guidance for Decision Makers: Tone at the Top, Policy as a Project, Cyber Security Management: Arriving at Goals, Cyber Security Documentation.

UNIT – IV **(12 Periods)**

Cyber Governance Issues: Net Neutrality, Internet Names and Numbers, Copyright and Trademarks, Email and Messaging.

Cyber User Issues: Malvertising, Impersonation, Appropriate Use, Cyber Crime, Geo location, Privacy.

Cyber Conflict Issues: Intellectual property Theft, Cyber Espionage, Cyber Sabotage, Cyber Welfare.

UNIT – V **(12 Periods)**

Cyber Management Issues: Fiduciary Responsibility, Risk Management, Professional Certification, Supply Chain, Security Principles, Research and Development.

Cyber Infrastructure Issue: Banking and finance, Health care, Industrial Control systems.

Data Backup: Data Backup, Types of Backup, Backup Procedures, Types of Storage.

Learning Resources:

Text Books:

1. NASSCOM "Handbook of Security Analyst", SSC/Q0901, 2015. (For Unit-I & Unit-V)
2. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt, Joseph Weiss "Cyber Security Policy Guidebook" John Wiley & Sons 2012. (For Unit-II, Unit-III, Unit-IV & Unit-V)

Reference Books:

1. Rick Howard "Cyber Security Essentials" Auerbach Publications 2011.
2. Richard A. Clarke, Robert Knake "Cyberwar: The Next Threat to National Security & What to Do About It" Ecco 2010.
3. Dan Shoemaker Cyber security The Essential Body of Knowledge, 1st ed. Cengage Learning 2011.
4. Augastine, Paul T.," Cyber Crimes and Legal Issues", Crecent Publishing Corporation, 2007.

IT/CS 410 (A) MACHINE LEARNING

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- learning system and concept learning.
- decision tree model.
- neural network models.
- bayesian and Instance based learning techniques.
- computational Learning and Instance theory .

Course Outcomes

At the end of the course the students will be able to

- know learning system using concept learning.
- solve Machine Learning problems using decision tree.
- develop solutions to machine learning problems using neural network models
- solve machine learning problems using Bayesian.
- apply instance based learning techniques to solve different problems.

UNIT – I **(12 Periods)**

INTRODUCTION TO MACHINE LEARNING: Well-Posed Learning Problem, Designing a Learning System, Perspectives and Issues in Machine Learning.

CONCEPT LEARNING AND THE GENERAL-TO-SPECIFIC ORDERING: Introduction, A Concept Learning Task, Concept Learning as Search. FIND –S: Finding a Maximally Specific

Hypothesis, Version Spaces and the Candidate Elimination Algorithm, Remarks on Version Spaces and Candidate-Elimination, Inductive Bias.

UNIT – II **(12 Periods)**

DECISION TREE LEARNING: Introduction, Decision Tree Representation, Appropriate Problems for Decision Tree Learning, The Basic Decision Tree Learning Algorithm.

DECISION TREE LEARNING: Hypothesis Space Search in Decision Tree Learning. Inductive Bias in Decision Tree Learning, Issues in Decision Tree Learning.

UNIT – III **(12 Periods)**

ARTIFICIAL NEURAL NETWORKS: Introduction, Neural Network Representation, Appropriate Problem for Neural network learning. Perceptrons, Multilayer Networks and the Back propagation Algorithm, **ARTIFICIAL NEURAL NETWORKS:** Remarks on Back Propagation Algorithm. An Illustrative Example: FACE Recognition, Advanced Topics in Artificial Neural Networks.

UNIT – IV **(12 Periods)**

EVALUATION HYPOTHESIS: Motivation, Estimating Hypothesis Accuracy, Basics of Sampling Theory, A General Approach for Deriving Confidence Intervals. Difference in Error of Two Hypotheses, Comparing Learning Algorithms.

BAYESIAN LEARNING: Introduction, Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and Least-Squared Error Hypothesis, Maximum Likelihood Hypothesis for

Predicting Probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm,Naïve Bayes Classifier, An Example : Learning to Classify Text, Bayesian Belief Network, The EM Algorithm.

UNIT – V **(12 Periods)**

COMPUTATIONAL LEARNING THEORY: Introduction, Probably Learning an Approximately Correct Hypothesis. Sample Complexity for Infinite Hypothesis Spaces. The Mistake Bound Model of Learning.

INSTANCE BASED LEARNING: Introduction, k-Nearest neighbor learning, Locally Weighted Regression, Radical Basis Functions, Case-base Reasoning, Remarks on Lazy and Eager Learning.

Learning Resources:

Text Book:

1. Tom Mitchell, “Machine Learning”, Mc Graw Hill publications, 1997.

Reference Books:

1. Christopher. M.Bishop, “Pattern Recognition and Machine Learning”, Springer publications, October, 2007.

2. Ethem Alpaydin, “Introduction to Machine Learning”, 2nd Edition, MIT Publisher, 2010.

Web References:

1. http://www.coursera.org/course/ml

IT/CS 410 (B) SEMANTIC WEB

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- basic concepts of Traditional Web and Semantic Web.
- the structure of Resource Description Framework.
- concepts of Web Ontology Language and Inference rules.
- applications of Semantic Web and their services
- concepts and usage of Ontologies.

Course Outcomes

At the end of the course the students will be able to

- familiarize with Semantic Web technologies.
- write RDF for Semantic Web-systems.
- analyze Semantic web structures by using OWL and Inference rules.
- develop Semantic Web applications.
- use Ontologies in Semantic Web-system.

UNIT – I **(12 Periods)**

The Semantic Web: Vision, Semantic Web Technologies, A Layered Approach.

Structured Web Documents: The XML Language, Structuring, Namespaces, Addressing and Querying XML Documents, Processing.

UNIT – II **(12 Periods)**

Describing Web Resources: RDF, Basic Ideas, XMLBasedSyntax RDF Schema .

RDF and RDF Schema in RDF Schema:Basic Ideas,The Language, An Axiomatic Semantics for RDF and RDF Schema, A Direct Inference System for RDF and RDFS, Querying in RQL.

UNIT – III **(12 Periods)**

Web Ontology Language OWL: The OWL Language, OWL in OWL, Future Extension.

Logic and Inference-Rrules: Monotonic Rules- syntax, semantics, Rule Markup in XML, Nonmonotonic Rules- syntax, semantics, Rule Markup in XML.

UNIT – IV **(12 Periods)**

Applications : Horizontal Information products at Elsevier, Data Integration at Audi, Skill Finding at Swiss Life.

Applications : Think Tank Portal at EnerSearch, eLearning, Web Services, Other Scenarios.

UNIT – V **(12 Periods)**

Ontology Engineering: Constructing Ontologies Manually, Reusing Existing Ontologies,

Using Semiautomatic Methods: OnToKnowledge Semantic Web Architecture, Application project.

Learning Resources:

Text Book:

1. Antoniou Grigoris, Groth Paul, Harmelen Frank Van, Hoekstra Rinke, A Semantic Web Primer, 3rd Edition, PHI.

Reference Books:

1. Karin K Brietman, Marco Antonio Casanova, Walter Truszkowski, Semantic Web – Concepts, Technologies and Applications. Springer 2007.
2. Liyang Yu, Semantic Web and Semantic Web Services, CRC 2007.
3. PascalHitzler, Markus Krotzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies, CRC Press.

IT 410(C) BIG DATA ANALYTICS

Lectures	:	4 periods/week	Sessional Marks	:	40
Tutorials	:	--	Sem. End Exam Marks	:	60
Sem. End Exam Duration	:	3 hours	Credits	:	**3**

Course Objectives

At the end of the course the students will understand

- overview of big data analytics.
- techniques required to manage and analyze big data problems.
- principles in achieving big data analytics with scalability and streaming capability.
- techniques to solve complex real-world analytics problems.

Course Outcomes

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

- know key issues in big data management and its associated applications.
- apply fundamental enabling techniques and scalable algorithms in big data analytics.
- Interpret models for similarity and distance measures.
- familiarize with mining data stream models.
- apply big data analytics in various applications.

UNIT – I **(12 Periods)**

Overview of Big Data: What is Big Data, Structuring Big Data, Elements of Big Data, Big Data Analytics.

NoSQL Data Management: Introduction to NoSQL, Aggregate Data Models, Key Value Data Models, Document Databases, Relationships, Graph Databases, Schema-Less Databases, Materialized Views, Distribution Models, Sharding.

UNIT – II **(12 Periods)**

Data Mining : What is Data Mining?, Statistical Limits on Data Mining.

Map Reduce and the New Software Stack: Distributed File Systems, MapReduce, Algorithms Using Map Reduce, Extensions to MapReduce, The Communication Cost Model.

UNIT – III **(12 Periods)**

Finding Similar Items: Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets.

Finding Similar Items: Locality-Sensitive Hashing for Documents, Distance Measures, the Theory of Locality-Sensitive Functions.

UNIT – IV **(12 Periods)**

Mining Data Streams: The Stream Data Model, Sampling Data in a Stream, Filtering Streams.

Mining Data Streams: Counting Distinct Elements in a Stream, Estimating Moments, Counting Ones in a Window.

UNIT – V **(12 Periods)**

Mining Link Analysis: Page Rank, Efficient Computation of Page Rank, Topic-Sensitive Page Rank, Link Spam.

Social-Network Graphs: Social Networks as Graphs, Clustering of Social-Network Graphs, Direct Discovery of Communities, Partitioning of Graphs.

Learning Resources:

Text Books:

1. BIG DATA Black Book, Dreamtech Press, 2015. (UNIT I).
2. Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, Mining of Massive Datasets, 2nd Edition, 2014. (Unit- II to UNIT-V).

Reference Books:

1. Taming the Big Data Tidal Wave: Finding Opportunities in huge data streams with advanced analytics, Bill Franks, Wiley Publishers, 2010.
2. Understanding Big data: Analytics for enterprise class Hadoop and streaming data, Paul Zikopoulos, Chiris Eaton, McGraw Hill Education.

IT 410 (D) INDUSTRY RELATED SUBJECT

IT 454
DISTRIBUTED AND CLOUD COMPUTING LAB

Practicals	:	3 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	3 hours	Credits	:	**2**

Course Objectives

At the end of the course, the student will understand

- the configuration and installation of Hadoop.
- the process of HADOOP setting and Running in a cluster.
- creation of Map Reduce and running a program in Map Reduce.
- account setup creation and use in AWS.

Course Outcomes

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

- know the basic foundation that is needed to develop HADOOP and Map Reduce.
- familiarize with the Map Reduce Application.
- use analytics in HADOOP.
- create AWS issues.

Lab Cycles

I. Getting Hadoop Up and Running in a cluster:

1. Setting up Hadoop on standalone machine.
2. Wordcount Map Reduce program using standalone Hadoop.
3. Adding the combiner step to the Wordcount Map Reduce program.
4. Setting up HDFS.
5. Using HDFS monitoring UI
6. HDFS basic command-line file operations.

7. Setting Hadoop in a distributed cluster environment.
8. Running the WordCount program in a distributed cluster environment.
9. Using Map Reduce monitoring UI

II. Hadoop Map Reduce Applications:

1. Choosing appropriate Hadoop data types.
2. Implementing a custom Hadoop Writable data type.
3. Implementing a custom Hadoop key type.
4. Emitting data of different value types from a mapper.
5. Choosing a suitable Hadoop Input Format for your input data format.
6. Formatting the results of Map Reduce Computation – using Hadoop Output Formats.

III. Analytics

1. Simple analytics using Map Reduce.
2. Performing Group-By using Map Reduce.
3. Calculating frequency distributions and sorting using Map Reduce.
4. Parsing a Complex dataset with Hadoop.
5. Joining two datasets using Map Reduce.

IV. AWS Account Setup and Services Overview

V. AWS Resource Discovery and Instance Setup

VI. Platform/Application Provisioning and Auto Scaling Adaptation.

IT 455 PROJECT WORK

Practicals	:	9 periods/week	Sessional Marks	:	40
			Sem. End Exam Marks	:	60
External Exam	:	---	Credits	:	**10**

Course Objectives

At the end of the course the students will

- groom up their Personality towards the Industrial Standards.
- test theoretical and practical skills on various subjects by working on real-time projects.
- understand the application of software Engineering concepts in completing their project.
- have awareness about the technology updates to beat the present hectic competition.

Course Outcomes

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

- work in a team to select a problem for project work.
- review and evaluate the available literature on the chosen problem.
- formulate the methodology to solve the identified problem.
- apply the principles, tools and techniques to solve the problem.
- prepare and present project report.

The Project work shall be carried out by a batch consisting not more than four students. It should help the students to comprehend and apply different theories and technologies that they have learnt through and are learning. It should lead to a substantial result as a comparative study, a new application of the technologies available or some extension to the works carried out by some researcher and published in conference/ journal. Each batch must carry out the analysis, design, implementation and testing of the entire project basing

on the Software Engineering principles. There shall be a total of four reviews for each batch.

0^{th} review	:	The idea/concept for their project shall be presented to the panel and get the approval.
1st review	:	The analysis and design carried out.
2nd review	:	The implementation and the testing done.
3rd review	:	Over all presentation of the work.

A comprehensive report is to be submitted at the end of the semester, which is certified by the concerned guide and the HOD. There shall be an external examiner to make an assessment and to carry out the Viva-Voce examination.