B.TECH III SEMESTER		**SC**	**L**	**T P**	**C**
			0	**0 4**	**2**
20CE3S09	**AUTOCAD 2D&3D (Skill Oriented Course-I)**				

Course Objectives: The objective of this lab is to teach the student usage of Auto cad and basic drawing fundamentals in various civil engineering applications, specially in building drawing.

Course Outcomes:

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

CO1: Use the Autocad commands for drawing 2D & 3D building drawings required for different civil Engg applications ,

CO2: Plan and draw Civil Engineering Buildings as per aspect and orientation.

CO3: Presenting drawings as per user requirements and preparation of technical report

LIST OF EXPERIMENTS

1. Introduction to computer aided drafting and different coordinate system
2. Drawing of Regular shapes using Editor Mode
3. Introduction GUI and drawing of regular shapes using GUI
4. Exercise on Draw tools
5. Exercise on Modify tools
6. Exercise on other tools (Layers, dimensions, texting etc.)
7. Drawing of building components like walls, lintels, Doors, and Windows. Using CAD software
8. Drawing a plan of Building and dimensioning
9. Drawing a plan of a residential building using layers
10. Developing a 3-D plan from a given 2-D plan

11. Developing sections and elevations for given a) Single storied buildings b) multi storied buildings

12. Auto CAD applications in surveying, mechanics etc.

TEXT BOOKS:

1. Computer Aided Design Laboratory by M. N. Sesha Praksh & Dr. G. S. Servesh –Laxmi Publications.

2. Engineering Graphics by P. J. Sha – S. Chand & Co.

B.TECH IV SEMESTER	HSMC	L	T	P	C
		3	0	0	3

20CE4T01: COMPLEX VARIABLES AND STATISTICAL METHODS

Pre-requisite: Basic knowledge about Calculus and Probability

Course Objective: Objective of the course is to impart

- basic understanding of complex variable theory
- description of sampling distribution of means, proportions & variances
- testing the hypothesis concerning means, proportions & variances

Course Outcomes:

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

CO 1: Determine analytic and non-analytic functions

CO 2: Analyze the analytic function into a power series which is useful in the study of communication systems.

CO 3: Understand random variables and probability distributions

CO 4: Apply different distributions to compute confidence intervals

CO 5: Test the hypothesis concerning means and proportions

SYLLABUS

UNIT-I: Analytic Functions:

Introduction, Complex function, Limit and continuity of a complex function, Derivative of f(z), Analytic functions, Harmonic functions & orthogonal system, finding analytic functions by Milne-Thomson method. Applications to flow problems.

UNIT-II: Complex Integration and Residues: (all theorems without proofs)

Complex integration, Cauchy's theorem and Cauchy's integral formula, Series of complex terms, Taylor's series and Laurent's series. Zeros and singularities of an analytic function, Residues and Cauchy-Residue theorem. Evaluation of real definite integrals using contour integration about unit circle.

UNIT-III: Random variables and distributions:

Introduction-Discrete & Continuous Random variable - Distribution functions.

Binomial, Poisson distributions. Continuous distribution: Normal distributions, Normal approximation to Binomial distribution.

UNIT-IV: Sampling Theory:

Introduction - Population and samples- Sampling distribution of means (s known)-Central limit theorem- t-distribution- Sampling distribution of means (s unknown)- Sampling distribution of variances - Point estimation- Maximum error of estimate - Interval estimation.

UNIT-V: Tests of Hypothesis:

Introduction –Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors – Level of significance - One tail and two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences.

Text Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rd Edition, 2014.
2. **Richards A Johnson, Irvin Miller and Johnson E Freund**. Probability and Statistics for Engineering, 9th Edition, PHI.

Reference Books:

3. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.
4. **Jay l. Devore,** Probability and Statistics for Engineering and the Sciences, 8thedition, Cengage Publshers.

B.TECH IV SEMESTER	**ESC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20CE4T02 ENGINEERING GEOLOGY

Course Objectives:

The objective of this course is:

- To introduce the Engineering Geology as a subject in Civil Engineering
- To enable the student to use subject in civil engineering applications.
- To know the Geological history of India.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

CO1: Identify and classify the geological minerals

CO2: Measure the rock strengths of various rocks

CO3: Classify and measure the earthquake prone areas to practice the hazard zonation

CO4: Classify, monitor and measure the Landslides and subsidence

CO5: Prepares, analyses and interpret the Engineering Geologic maps

CO6: Analyses the ground conditions through geophysical surveys.

CO7: Test the geological material and ground to check the suitability of civil engineering project construction.

CO8: Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc...

SYLLABUS

UNIT-I: Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies

Weathering: Weathering of rocks, Geological agents, weathering process of Rock, River process and their development.

UNIT-II

Mineralogy And Petrology: Definitions of mineral, Structures of silicates and rock, Different methods of study of mineral and rock, The study of physical properties of minerals and rocks for megascopic study for the following minerals and rocks, Common rock forming minerals are Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and other ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite And Bauxite. Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate and their importance in Civil Engineering.

UNIT-III

Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering–Indian stratigraphy. Aims of statigrtaphy, Principles, Geological time scour, Geological division in India, Major stratigraphic units in India.

UNIT-IV

Earthquakes And Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides Case studies.

UNIT-V

Geophysics: Importance of Geophysical methods, Classification, Principles ofGeophysicalstudybyGravitymethod,Magneticmethod,Electricalmethods,S eismicmethods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

Geology of Dams, Reservoirs And Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Life of Reservoirs Purpose of Tunneling, effects, Lining of Tunnels. Influence of Geology for successful Tunneling.

Text Books:

1. Engineering Geology, N. Chenn Kesavulu, Laxmi Publications, 2nd

Edition, 2014.

2. Engineering Geology, Subinoy Gangopadhay, Oxford University press

References:

1. Engineering Geology, D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.
2. Engineering Geology, Vasudev Kanithi, University Press.
3. Engineering Geology for Civil Engineers P. C. Varghese, PHI learning pvt. Ltd.
4. G Fundamentals of Engineering Geology' P.G. Bell, B. S. P. Publications, 2012
5. Geology for Engineers and Environmental Society, Alan E Kehew, person publications, 3rd edition.
6. Engineer's Geology by S. K. Duggal, H.K. Pandey, N. Rawd, McGraw Hill education.
7. Engineering Geology, K. S. Valdiya, McGraw Hill.
8. Environmental Geology, K. S Valdiya, Mcgraw Hill Publications, 2nd Edition.

B.TECH IV SEMESTER **ESC**

L	T	P	C
3	0	0	3

20CE4T04 STRUCTURAL ANALYSIS-1

Pre Requisites: Strength of Materials –I

Objectives: To make the students to understand the principles of analysis of structures of static and moving loads by various methods.

Course Outcomes: after the completion of the course student should be able to

CO1: Able to analyse the determinate and in-determinate structures

CO2: Able to understand the behavior of Structural systems

CO3: Able to evaluate the response of structural systems subjected to static and moving loads

SYLLABUS

UNIT – I

ANALYSIS OF PERFECT FRAMES:

Determinate and indeterminate structures. Degree of freedom. Types of frames- Perfect, Imperfect and Redundant pin jointed frames. - Analysis of determinate pin jointed frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

UNIT-II

Columns and Struts:

Introduction–Types of columns–Short, medium and long columns– Axially loaded compression members–Crushing load–Euler's theorem-assumptions-derivation of Euler's critical load formulae for various end conditions–Equivalent length of a column–slenderness ratio–Euler's critical stress–Limitations of Euler's theory– Rankine–Gordon formula–Long columns subjected to eccentric loading–Secant formula–Empirical formulae–Straight line formula–Prof. Perry's formula.

UNIT – III

PROPPED CANTILEVER and FIXED BEAMS:

Determination of static and kinematic indeterminacies for beams- Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia, subjected to uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - Shear force and Bending moment diagrams for Propped Cantilever and Fixed Beams-Deflection of Propped cantilever and fixed beams; effect of sinking of support, effect of rotation of a support.

UNIT – IV

CONTINUOUS BEAMS:

Introduction-Continuous beams. Clapeyron's theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang. Effects of sinking of supports.

SLOPE DEFLECTION METHOD:

Derivation of slope-deflection equation, application to continuous beams with and without settlement of supports. Determination of static and kinematic indeterminacies for frames. Analysis of Single Bay – Single storey Portal Frames by Slope Deflection Method Including Side Sway. Shear force and bending moment diagrams and Elastic curve.

UNIT – V

MOVING LOADS AND INFLUENCE LINES:

Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length. Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section - Point loads, UDL longer than the span, UDL shorter than the span- Influence lines for forces in members of Pratt and Warren trusses. Equivalent uniformly distributed load. Focal length.

Text Books:

1) Structural Analysis Vol–I & II by V. N. Vazirani and M. M. Ratwani, Khanna Publishers.
2) Structural Analysis Vol I & II by G.S.Pandit and S.P.Gupta, Tata McGraw Hill Education Pvt. Ltd.
3) Basic Structural Analysis by K.U.Muthu *et al.,* I.K.International Publishing House Pvt.Ltd.

References:

1) Structural Analysis by R.C.Hibbeler, Pearson Education
2) Mechanics of Structures Vol – I and II by H.J.Shah and S.B.Junnarkar, Charotar Publishing House Pvt. Ltd.
3) Structural Analysis by Devdas Menon, Narosa Publishing House.
4) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Education Pvt. Ltd.
5) Fundamentals of Structural Analysis by M.L.Gamhir, PHI Learning Pvt. Ltd
6) Structural Analysis -I by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.

B.TECH IV SEMESTER

HSMC	L	T	P	C
	3	0	0	3

20CE4T05 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- The Learning objectives of this paper are to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting
- To familiarize about the Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation
- Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals

Course Outcomes:

CO1: The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product

CO2: The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs

CO3: The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units

CO4: The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis

CO5: The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making

SYLLABUS

UNIT I

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand-Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of

Demand, Types of Elasticity of Demand and Measurement Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT II

Theories of Production and Cost Analyses: Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

UNIT III

Introduction to Markets, Theories of the Firm & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles : Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

UNIT IV

Introduction to Accounting & Financing Analysis: Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

UNIT V

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(payback period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Text Books:

1) A R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

Reference Books:

1) Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & Company Ltd.

2) JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition edition

3) N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & Company Ltd.

4) MaheswariS.N,AnIntroduction to Accountancy, Vikas Publishing House Pvt Ltd

5) I.M Pandey, Financial Management , Vikas Publishing House Pvt Ltd

6) V. Maheswari, Managerial Economics, S. Chand & Company Ltd.

B.TECH IV SEMESTER	PCC	L	T	P	C
		0	0	3	1.5

20CE4L06 ENGINEERING GEOLOGY LAB

Course Objectives:

The objective of this lab is that to provide practical knowledge about physical properties of minerals, rocks, drawing of geological maps, showing faults, uniformities etc.

Course Outcomes:

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

CO1: Understand the method and ways of investigations required for Civil Engineering projects

CO2: Identify the various rocks, minerals depending on geological classifications

CO3: Learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides and settlement.

CO4: Write a technical laboratory report

LIST OF EXPERIMENTS

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite;

   Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
4. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Pegmatite, and Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.

5. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
6. Identification of rocks (Metamorphic Petrology): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
7. Study of topographical features from Geological maps. Identification of symbols in maps.
8. Simple structural Geology Problems (Strike & Dip and Bore hole data)

LAB EXAMINATION PATTERN:

1. Description and identification of minerals
2. Description and identification of rocks (igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problem.
5. Simple bore hole data problem.

Note: Any10 Experiments must be completed**.**

B.TECH IV SEMESTER		**SC**	**L**	**T**	**P**	**C**
			0	**0**	**4**	**2**
20CE4S09	**REVIT ARCHITECTURE (Skill Oriented Course-II)**					

1 Introduction to Revit Architecture Software, User Interface,

2 Introduction to BIM

3 Introduction to Basic Commands, Templates

4 Setting of units, explaining about Walls Doors, Windows, Edit Type

5 Placing of Components, Explaining about Modify Tools

6 Creating Floor, Ceiling, Editing Floor and Ceiling

7 Curtain Walls, Wall Opening

8 Roofs Types of Roofs

9 Staircase Types of Staircase

10 Ramp, Railing, Creating Section View

11 Text, Dimension, Annotations, Model Text, Model line, Room & Area

12 Paint, Colour Scheme, Creating new Materials, Sweep, Extrude Modeling

B.TECH IV SEMESTER

	L	T	P	C
MC	2	-	-	-

20CE4M10 **CONSTITUTION OF INDIA**

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative

Course Outcomes:

At the end of the course, the student will be able to have a clear knowledge on the following:

CO1: Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.

CO2: Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

CO3: Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India.

CO4: Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.

CO5: Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy.

SYLLABUS

UNIT I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution -Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, Rajya Sabha, The Supreme Court and High Court: Powers
and Functions;

UNIT III

State Government and its Administration Governor, Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT IV

A Local Administration, District's Administration Head, Role and Importance, Municipalities, Mayor and role of Elected Representative, CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy(Different departments),
Village level, Role of Elected and Appointed officials, Importance of grass root democracy

UNIT V

Election Commission: Election Commission, Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

References:

1) Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Pvt. Ltd.

2) Subash Kashyap, Indian Constitution, National Book Trust

3) J.A. Siwach, Dynamics of Indian Government & Politics

4) D.C. Gupta, Indian Government and Politics

5) H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

6) J.C. Johari, Indian Government and Politics Hans

7) J. Raj Indian Government and Politics

8) M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in

Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

9) Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-sources:

1) nptel.ac.in/courses/109104074/8
2) nptel.ac.in/courses/109104045/
3) nptel.ac.in/courses/101104065/
4) www.hss.iitb.ac.in/en/lecture-details
5)www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

INTERNSHIP/SOCIAL RESPONSIBILITY PROJECT
VII SEMESTER

Lecture: 0	Practical: 4	Internal Marks	: 40
Credits:2		External Marks	: 60

A) There shall be an Industrial oriented Internship / Social Responsibility Project in Collaboration with an Industry (or) Government organization of the relevant specialization to be registered immediately after III Year II Semester Examinations and taken up during the summer vacation for about Minimum six weeks duration.

B) The industry-oriented Internship or Social responsibility project shall be submitted in a report form, and a presentation of the same shall be made before a Committee, which evaluates it for 100 marks. The committee shall consist of Head of the Department, the supervisor of internship and a Senior Faculty Member of the Department. There shall be no internal marks for Industry oriented internship. The internship / social responsibility project shall be evaluated in the IV year I Semester.

OPEN ELECTIVE – IV
A) ADVANCED CIVIL ENGINEERING TECHNOLOGIES
VIII SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Objectives:
The objective of this course is:
1. To give a brief Introduction on smart technologies
2. Learn about prestressed concrete techniques
3. To understand the principles and uses of Electronic Surveying instruments
4. To understand Pre - fabricated building technology
5. To give a brief knowledge on Advanced methods in Earth retaining structures

Course Outcomes:
Upon the successful completion of this course, the students will be able to:
1. Apply the principles and uses of Electronic Surveying instruments
2. Understand the Pre stressed concrete
3. Advanced methods in Earth retaining structures
4. Application Pre - fabricated building technology

SYLLABUS

UNIT 1. **Smart Technologies:**
Overview of IoT - Define IoT, how IoT work, key features of IoT, components of IoT : hardware, software, technology and protocols, advantages and disadvantages of IoT – IoT Applications - Smart Cities, Smart Energy and the Smart Grid, Smart Transportation and Mobility, Smart Home, Smart Buildings and Infrastructure

UNIT 2. Electronic Survey instruments and GPS and GIS
Principle and uses of EDM – Electronic theodolite, features – uses. Global positioning system (G.P.S) – principle – segments – space, control and user segments – receivers – observation and data processing - applications in Civil Engineering – advantages and disadvantages of GPS.Geographical Information System (GIS) – definition– types data used – use and application of GIS in Civil Engineering.

UNIT 3. Prestressed Concrete
Introduction – Basic principles – Systems of prestressing – Types of prestressing .Advantages and Disadvantages. Requirements of steel and concrete for prestressed concrete. Losses of Prestress. Tensioning devices – Method of Prestressing – Pretensioning system – Post tensioning systems.

UNIT 4 Advanced methods in Earth retaining structures
Concept of advanced earth retaining structures. Advantages of advanced earth retaining structures Methods of advanced earth retaining structures –Reinforced anchored earth wall geogrids, geomats,

UNIT 5 Pre-fabricated building technology

Alternatives for cast in-situ structures - Understand pre fabrication technology -Importance for standardization– pre fabricated structures their utility & advantages Materials used in pre-fabricated elements – suitability for various climatic conditions. Types of pre-fabricated systems – large panel systems - frame systems – slab /column systems with walls – mixed systems

TEXT BOOKS

1. Prestressed Concrete by N Krishna Raju, Mc Graw Hill, New Delhi.
2. CBRI Building materials and components.
3. NPTEL Lecture 31, Reinforced Soil Retaining Walls-Design and Construction Prof.Siva kumar Babu, IISc, Bangalore.
4. Prefab Architecture, a guide to modular design & construction, Ryan E Smith, John Wiley Publishers.

MOOCS/ SURVEY CAMP

VIII SEMESTER

Lecture: 0	Practical: 4	Internal Marks	: 40
Credits:2		External Marks	: 60

MASSIVE OPEN ONLINE COURSES:

Greater flexibility to choose variety of courses is provided through Massive Open Online Courses (MOOCs) during the period of study. Students are permitted to register for MOOCs from fifth semester However the Departmental Committee (DC) of the respective has to approve the courses under MOOCs. The grade equivalency will be decided by the respective Board of Studies (BoS).

The student should select the subject of discipline centric for MOOC. The Students can register from NPTEL/GIAN/TEQIP. The registration can be done any time from fifth semester.

(or)

SURVEY CAMP:

Pre-requisites:

Knowledge of Surveying, Irrigation and Bridge Drawing, High way Engineering Town Planning and Water Resource Engineering,
The most important pillar of learning is “DOING”. Civil Engineer should be very conversant with the actual works of surveying, which this survey camp/project aims at the following course objectives.

Course Objectives of the survey camp works are:

1. Apply knowledge of mathematics, science, and engineering to understand the measurement techniques
2. To train the students under difficult and realistic situation of the surveying project.
3. To acquire a sound practical knowledge and application of theory and in practical to overcome the difficulties that could arise in field during surveying.
4. The use of different survey instrument and to develop the team spirit at work
5. To impart training in the use of modern surveying instruments and to acquire a comprehensive idea of the project.
6. To impart confidence in the handling and management of the survey project.

Sample Survey Projects:

1. Triangulation with Total Station.

2. New Tank Project

1. Reconnaissance of the area to be mapped. setting benchmark using GPS
2. Fly levelling to establish T.B.M to the site& fly-back levelling
3. Fixing the alignment of proposed bund,
4. Conduct profile levelling and cross sectioning along the proposed centre line of the tank bund.
5. Capacity of reservoir by Radial contouring
6. Calculation of capacity
7. Block levelling at Sluice point of centre line of bund
8. Block levelling for weir
9. Canal Alignment Starting from sluice point with longitudinal sectioning and cross sectioning
10. To determine the azimuth of a line, latitude and longitude of the place by taking extra-meridian observation on a sun. Use of GPS to determine latitude and longitude

(Graded activities) Drawings to be prepared

1. Index Map
2. Contour map of water spread area with Capacity of reservoir calculations
3. Longitudinal sectioning
4. Cross sectioning
5. Block levelling with contours showing weir details should consist of
1. Half plan at top & half plan at foundation.
2. Half sectional elevation, half front elevation.
3. Cross section of tank weir across the body wall.
6. Block levelling with contours showing sluice details should consist of
1. Half plan at top & half plan at foundation.
2. Half sectional elevation, half front elevation.
3. Cross section of tank weir across the body wall.
7. Canal cross-section of fully cutting, fully filled and Partial at different chainages
8. Longitudinal sectioning of Canal at different chainages
9. Plan of bund & canal alignment showing location of hydraulic structures and various reduced levels

3. Quantity surveying

1. Earthwork calculation of bund.
2. Earthwork calculation of canal.
3. Estimation of weir positioned on block levelling.
4. Estimation of Sluice positioned on block levelling.

4. Highway Project:

(Terrain should be chosen such that it should include vertical & Horizontal curve)

1. Reconnaissance of the area
2. Align a new road between two obligatory points.
3. Conduct Longitudinal and cross-sectioning surveys
4. Projecting a road of given gradient.
5. Block leveling @ the lowest level or valley curve
6. Connecting to new road alignment, surveying existing road 90m and exploring possibility of widening.

(Graded activities) Drawings to be prepared (Drawing should be preferably done using AutoCAD).

1. Index plan
2. Plan showing alignment of road
3. L.S & C.S of Road at different chainages as per IRC standards(Report should justify the selected alignment with details of all geometric designs for horizontal curve, traffic and design speed assumed)
4. Block levelling @ the lowest level or valley curve placing Culvert/Bridge

1. Half plan at top & half plan at foundation.
2. Half sectional elevation, half front elevation.
3. Half Cross section @centre half Cross section @ abutment

Quantity surveying

1. Calculate the earthwork involved by determining the cross-section of the highway at various intervals.
2. Quantity surveying of Proposed culvert/Bridge

5. Town Planning Project

1. Town planning project new layout as per Zoning Regulations by using total station
2. Preparation of existing village map/layout 2 days.

6. Water Supply and Sanitary Project

(Public Health Engineering)

1. Examination of sources of water supply
2. Calculation of quantity of water required based on existing and future projected population for a village.
3. Preparation of village map and location of sites for ground level
4. Block leveling for overhead tanks
5. Underground drainage system surveys for laying the sewers.
6. Block leveling for Oxidation pond.

(Graded activities) Drawings to be prepared

1. Plan of water supply line, sewer lines in village map
2. Block leveling placing overhead tanks
3. Block leveling Placing Oxidation pond.

Quantity surveying

1. Estimation of manhole
2. Estimation of water supply line, Overhead tank

Note:

1. At least one of the above should be done by using TOTAL STATION
2. The survey camp Report should be attached with field book, calculation sheets, all plans/drawings, estimates of earth work and structure in spread sheet and should be submitted in the form of Hardcopy and softcopy (CD)

B.TECH II SEMESTER **BSC**

L	T	P	C
3	0	0	3

20EE2T01 TRANSFORM TECHNIQUES

Pre-requisite: Linear Algebra and Differential Equations

Course Objective: Objective of the course is to impart

- Learning the techniques of Laplace transforms to solve ordinary differential equations
- knowledge of Fourier series & Fourier transforms for piecewise continuous functions
- knowledge of solving boundary valued problems

Course Outcomes: At the end of the course, student will be able to

CO1: Able to analyze a class of integrals in terms of beta and gamma functions

CO2: Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing

CO3: Analyze the general periodic functions in the form of an infinite convergent sine and cosine series

CO4: Illustrate the methods to solve the boundary value problems

CO5: Determine a solution of a discrete system using Z- transforms

SYLLABUS

UNIT-I: Special functions:

Beta function, Properties & problems, Gamma function, properties & problems, Relation between Beta and Gamma functions, Evaluation of improper integrals.

UNIT-II: Laplace Transforms (all properties without proofs):

Definition, Transforms of elementary functions, properties of Laplace transforms, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, Division by t, Evaluation of improper integrals.

Inverse Laplace transforms–Method of partial fractions, other methods of finding inverse transforms, Convolution theorem (without proof). **Application:**

Application to differential equations.

UNIT-III: Fourier Series & Fourier Transforms:

Euler's formulae (without proof), Conditions of Fourier expansion, Functions having points of discontinuity, Change of inerval, Even and odd functions, Half-range series.

Fourier Integral theorem (without proof), Fourier cosine & sine integral, complex form of Fourier integral, Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms (without proof), Convolution theorem(without proof), finite & infinite Fourier sine & cosine transforms.

UNIT-IV: Partial Differential Equations:

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Method of separation of Variables, Applications: One-dimensional wave and heat equations, two-dimensional heat equation.

UNIT-V: Z-Transforms: (all properties without proofs)

Introduction, definition, some standard z-transforms, linearity property, damping rule, some standard results, shifting U_n to the right, multiplication by n, initial and final value theorems, Inverse z-transforms, convolution theorem, evaluation of inverse z-transforms by partial fractions, applications to difference equations.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH IV SEMESTER **PCC**

L	T	P	C
3	0	0	3

20EE4T03 :ELECTRICAL MEASUREMENTS

Course Objectives:

- To study the principle of operation and working of different types of instruments. Measurement of voltage and current.
- To study the working principle of operation of different types of instruments for measurement of power and energy
- To understand the principle of operation and working of dc and ac potentiometers.
- To understand the principle of operation and working of various types of bridges for measurement of parameters –resistance, inductance, capacitance and frequency.
- To study the principle of operation and working of various types of magnetic measuring instruments.
- To study the applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns

Course Outcomes:

At the end of the course student will be able to

CO1: Choose right type of instrument for measurement of voltage and current for ac and dc.

CO2: Choose right type of instrument for measurement of power and energy

CO3: Use potentiometer and instrumentation transformer.

CO4: Select suitable bridge for measurement of electrical parameters

CO5: Measure frequency and phase difference between signals using CRO. Able to use digital instruments in electrical measurements.

SYLLABUS

UNIT-I: Measuring Instruments

Classification of measuring instruments. Requirements of measuring instruments. Deflecting, control and damping torques. PMMC instrument, moving iron attraction and repulsion type instruments. Errors and compensations– Extension of range using shunts and series.

UNIT-II: Measurement of Power and Energy

Construction, working and torque equation of single and three phase Dynamometer wattmeter. Errors and their compensation. LPF wattmeter. Two wattmeter method, measurement of reactive power. Construction, working and torque equation of Single phase induction type Energy meter. Errors and their compensation. Testing by phantom loading using R.S.S. meter. Single phase Power factor meter-electro dynamometer type.

UNIT-III: Instrumentation transformers and Potentiometers

Construction of CT and PT, Ratio and phase angle errors. Potentiometers: Standardization. Principle and working of potentiometers. Standardization of potentiometer, Construction and working of Crompton's DC potentiometer

UNIT-IV: Measurement of parameters Measurement of Resistance: Voltmeter-ammeter method. Kelvin's Double Bridge, Megger. A.C. Bridges: Balance equation for an AC bridge. Measurement of Inductance: Maxwell's Bridge, Anderson's Bridge, Hay's Bridge. Measurement of Capacitance: Schering Bridge, Wien's Bridge.

UNIT-V: Digital meters

Advantages of digital meters -Digital Voltmeter: Successive approximation type, Ramp type and integrating type. Digital frequency meter–Digital multimeter–Digital Tachometer.

Text Books:

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing.

2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

Reference Books:

1. Electrical & Electronic Measurement & Instruments by A. K. Sawhney Dhanpat Rai & Co. Publications.

2. Electrical and Electronic Measurements and instrumentation by R.K. Rajput, S. Chand.

3. Electrical Measurements – by Buckingham and Price, Prentice – Hall

4. Electrical Measurements by Forest K. Harris. John Wiley and Sons

B.TECH IV SEMESTER

	L	T	P	C
HSMC	3	0	0	3

20EE4T05 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- The Learning objectives of this paper are to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting
- To familiarize about the Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation
- Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals

Course Outcomes:

CO1: The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product

CO2: The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs

CO3: The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units

CO4: The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis

CO5: The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making

SYLLABUS

UNIT I

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand-Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement Demand forecasting and

Methods of forecasting, Concept of Supply and Law of Supply.

UNIT II

Theories of Production and Cost Analyses: Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

UNIT III

Introduction to Markets, Theories of the Firm & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles : Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

UNIT IV

Introduction to Accounting & Financing Analysis: Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

UNIT V

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(payback period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Text Books:

1) A R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

Reference Books:

1) Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & Company Ltd.
2) JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition

edition
3) N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & Company Ltd.
4) MaheswariS.N,AnIntroduction to Accountancy, Vikas Publishing House Pvt Ltd
5) I.M Pandey, Financial Management , Vikas Publishing House Pvt Ltd
6) V. Maheswari, Managerial Economics, S. Chand & Company Ltd.

B.TECH IV SEMESTER

PCC	L	T	P	C
	0	0	3	1.5

20EE4L07 ELECTRICAL MEASUREMENTS LAB

Course Objectives:

- To understand the correct function of electrical parameters and calibration of voltage, current, single phase and three phase power and energy, and measurement of electrical characteristics of resistance, inductance and capacitance of a circuits through appropriate methods.
- To understand testing of transformer oil.

Course Outcomes:

CO1: To measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance.

CO2: To test transformer oil for its effectiveness.

CO3: To measure the parameters of inductive coil.

LISTS OF EXPERIMENTS

Any 10 of the Following experiments are to be conducted:

1. Calibration and Testing of single phase energy Meter
2. Calibration of dynamometer wattmeter using phantom loading
3. Measurement of 3 phase reactive power with single phase wattmeter for balanced loading.
4. Calibration of LPF wattmeter by direct loading.
5. Calibration of Power factor meter
6. Measurement of Power by 3 Voltmeter and 3 Ammeter method.
7. Measurement of parameters of a Choke Coil using 3 Voltmeter and 3 Ammeter method.
8. Calibration of PMMC ammeter and voltmeter using Crompton D.C. Potentiometer
9. Measurement of resistance and Determination of Tolerance using Kelvin's double Bridge.
10. Capacitance Measurement using Schering Bridge.
11. Inductance Measurement using Anderson Bridge.
12. Dielectric oil testing using H.T test Kit.

B.TECH IV SEMESTER

	L	T	P	C
ESC	0	0	3	1.5

20EE4L08 DATA STRUCTURES THROUGH C LAB

Course Objectives:

- Understand different Data Structures
- Apply Data Structures to real world problems using C.

Course Outcomes:

CO1: Use basic data structures such as arrays and linked list.

CO2: Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.

CO3: Use various searching and sorting algorithms.

CO4: Understand and use Trees for complex operations

Topics Covered: Searching, Sorting, Linked Lists, Stacks, Queues, Trees-Operations, Binary Search Trees- Operations

LIST OF EXPERIMENTS:

Exercise -1 (Searching)

a) Write C program that use both recursive and non-recursive functions to perform Linear search for a Key value in a given list.

b) Write C program that use both recursive and non-recursive functions to perform Binary search for a Key value in a given list.

Exercise -2 (Sorting-I)

a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order.

b) Write C program that implement Quick sort, to sort a given list of integers in ascending order.

c) Write C program that implement Insertion sort, to sort a given list of integers in ascending order.

Exercise -3 (Sorting-II)

a) Write C program that implement radix sort, to sort a given list of integers in ascending order

b) Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise -4 (Singly Linked List)

a) Write a C program that uses functions to create a singly linked list

b) Write a C program that uses functions to perform insertion operation on a singly linked list

c) Write a C program that uses functions to perform deletion operation on a singly linked list

d) Write a C program to reverse elements of a single linked List.

Exercise -5 (Queue)

a) Write C program that implement Queue (its operations) using arrays.

b) Write C program that implement Queue (its operations) using linked lists

Exercise -6 (Stack)

a) Write C program that implement stack (its operations) using arrays

b) Write C program that implement stack (its operations) using Linked list

c) Write C program for implementing infix to postfix conversion

d) Write a C program that uses Stack operations to evaluate postfix expression

Exercise -7 (Binary Tree)

Write a recursive C program for traversing a binary tree in preorder, in-order and post-order.

Exercise -8 (Binary Search Tree)

a) Write a C program to create a BST

b) Write a C program to insert a node into a BST.

c) Write a C program to delete a node from a BST.

Text Books:

1. Data Structures Using C. 2ndEdition. Reema Thareja, Oxford.

2. Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

Reference Books:

1. Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.

2. Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.

3. Data Structures with C, Seymour Lipschutz TMH

B.TECH IV SEMESTER

SC	L	T	P	C
	0	0	4	2

20EE4S09 INTRODUCTION TO MATLAB
(Skill Oriented Course)

LIST OF EXPERIMENTS

Any 10 of the following experiments are to be conducted

MATLAB FUNDAMENTALS:

1) Introduction, Installation of MATLAB, History, Key Features, User interface, Command window, Workspace, Setting directory – MATLAB editor, saving m files, Writing & Executing script files.

2) Write a program involving assigning of variables, Arrays and vectors, BODMOS rules, arithmetic, logical operations & solving arithmetic equations.

4) Write a program with basic Matrix operations like creating matrices, find inverse, determinant, Transpose of matrix.

PLOTS AND GUI:

5) Write a program for making 2D Plots with Basic plotting methods, specifying line styles, legend & colours, controlling the Axes, Multiple plots in one Figure and plot 3D plots with Creating Mesh & Surface plots, visualizing, Subplots.

6) Design a Graphical User Interface (GUI) with functions, component & Menu Designing Applications.

INTRODUCTION TO SIMULINK:

7) Simulate an RLC circuit in SIMULINK Environment using Simulink Library.
8) Model a simple circuit with Equation oriented Design.
9) Design a Subsystem Model to Connect & callback to main system.

LOOPS, CONDITIONAL STATEMENTS AND FUNCTIONS:

10) Write a program with Loop controls like for, while, continue, and break.

11) Write a program with Conditional Statements like if, else, Switch.

12) Write a program with user defined functions with Function calling and built in functions.

STUDY & WORKING WITH TOOLBOXES:

13) Design a Power electronics circuit using Sandscape Power Systems Toolbox.

14) Design an optimal system with Optimization Toolbox.

15) Develop a basic control system using Control System Toolbox.

B.TECH IV SEMESTER

MC	L	T	P	C
	2	0	0	-

20EE4M10 **CONSTITUTION OF INDIA**

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative

Course Outcomes:

At the end of the course, the student will be able to have a clear knowledge on the following:

CO1: Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.

CO2: Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

CO3: Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India.

CO4: Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.

CO5: Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy.

SYLLABUS

UNIT I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution -Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II

Union Government and its Administration Structure of the Indian Union: Federalism, CentreState relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, Rajya Sabha, The

Supreme Court and High Court: Powers and Functions;

UNIT III

State Government and its Administration Governor, Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT IV

A.Local Administration, District's Administration Head, Role and Importance, Municipalities, Mayor and role of Elected Representative, CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy(Different departments),

Village level, Role of Elected and Appointed officials, Importance of grass root democracy

UNIT V

Election Commission: Election Commission, Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

References:

1) Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Pvt. Ltd.

2) Subash Kashyap, Indian Constitution, National Book Trust

3) J.A. Siwach, Dynamics of Indian Government & Politics

4) D.C. Gupta, Indian Government and Politics

5) H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

6) J.C. Johari, Indian Government and Politics Hans

7) J. Raj Indian Government and Politics

8) M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

9) Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-sources:

1) nptel.ac.in/courses/109104074/8

2) nptel.ac.in/courses/109104045/

3) nptel.ac.in/courses/101104065/

4) www.hss.iitb.ac.in/en/lecture-details

5)www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

DIGITAL SIGNAL PROCESSING

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objectives: This course is an essential course that provides design techniques for processing all type of signals in various fields. The main objectives are:

- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous-time and discrete time signals and systems.
- To study fundamentals of time, frequency and Z-plane analysis and to discuss the inter-relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.

Course Outcomes: On completion of this subject, the student should be able to:

- Perform time, frequency, and Z -transform analysis on signals and systems.
- Understand the inter-relationship between DFT and various transforms.
- Understand the significance of various filter structures and effects of round off errors.
- Design a digital filter for a given specification.
- Understand the fast computation of DFT and appreciate the FFT processing.

SYLLABUS

UNIT - I

Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Normalized Frequency, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems

UNIT - II

Realization of Digital Filters: Applications of Z – Transforms, Solution of Difference Equations of Digital Filters, System Function, Stability Criterion, Frequency Response of Stable Systems, Realization of Digital Filters – Direct, Canonic, Cascade and Parallel Forms.

UNIT - III

Discrete Fourier Transforms: Properties of DFT, Linear Convolution of Sequences using DFT, Computation of DFT: Over-Lap Add Method, Over-Lap Save Method, Relation between DTFT, DFS, DFT and Z-Transform. Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with General Radix-N.

UNIT - IV

IIR Digital Filters: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital Filters from Analog Filters, Step and Impulse Invariant Techniques, Bilinear Transformation Method, Spectral Transformations.

UNIT - V

FIR Digital Filters: Characteristics of FIR Digital Filters, Frequency Response, Design of FIR Filters: Fourier Method, Digital Filters using Window Techniques, Frequency Sampling Technique, Comparison of IIR & FIR filters.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009
3. Fundamentals of Digital Signal Processing – Loney Ludeman, John Wiley, 2009

REFERENCES:

1. Digital Signal Processing – Fundamentals and Applications – Li Tan, Elsevier, 2008
2. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
3. Digital Signal Processing - A Practical approach, Emmanuel C. Ifeachor and Barrie W. Jervis, 2nd Edition, Pearson Education, 2009

ELECTRIC VEHICLES
(Professional Elective-I)

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To study the different drive train configurations of electric vehicles
- To propose the various propulsion and energy storage systems for EHVs
- To know the sizing of propulsion motors and other systems involved in EH vehicles
- To carry out different design case studies of EHv and BEVs

Course Outcomes:

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

- Assess the performance, societal and environmental impact of EHVs having known their past history
- Implement various drive train topologies and control strategies in Electric and Hybrid vehicles
- Recommend, Design/Size and Control different electric propulsion units and other components of EHVs and BEVs
- Appropriately select the energy storage system and strategize its management in EHVs

SYLLABUS

UNIT I:
Introduction to Electric Vehicles: History of electric vehicles (EV) and hybrid electric vehicle (EHV), need and importance of EV and HEV, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies, Power/energy supplies requirements for EV/HEV applications, vehicle power source characterization, and transmission characteristics.

UNIT-II:
Hybrid Electric Drive-trains: Basic architecture and concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.
Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.

UNIT-III:
Electric Propulsion Unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, and Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV:

Battery Energy Storage Systems: Battery Basics - Lead-Acid Battery -Cell Discharge Operation - Cell Charge Operation-Construction-Battery Parameters - Battery Capacity-Discharge Rate - State of Charge- State of Discharge- Depth of Discharge-Technical Characteristics - Practical Capacity -Battery Energy -Constant Current Discharge -Specific Energy - Battery Power -Specific Power -Batteries for EV applications.

UNIT-V:

Modelling of EV/HEV: Modelling and analysis of EV/HEV drive train sizing of motor, and design of traction power electronics, various vehicle subsystems.

TEXT BOOKS:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2010.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2009.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

REFERENCES:

1. Jefferson, C.M., Barnard and R.H., Hybrid Vehicle Propulsion, WIT Press, Boston, 2002
2. Jack Erjavec and Jeff Arias, “Hybrid, Electric and Fuel Cell Vehicles”, Cengage Learning, 2012
3. SerefSoylu “Electric Vehicles - The Benefits and Barriers”, InTech Publishers, Croatia, 2011
4. Jack Erjavec and Jeff Arias, “Alternative Fuel Technology – Electric, Hybrid and Fuel Cell Vehicles”, Cengage Learning Pvt. Ltd., New Delhi, 2007
5. Seth Leitman, “Build Your Own Electric Vehicle” McGraw hill, New York, USA, 2013

RENEWABLE ENERGY SOURCES
(Professional Elective-I)

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objective:

- To give sufficient knowledge about the promising new and renewable sources of energy
- Explain the concept of various forms of renewable energy
- Learn the present energy scenario
- Analyse the environmental aspects of renewable energy resources.

Course Outcomes:
- Know the need of various renewable energy systems
- understand the concepts of bio-energy,
- Acquire the knowledge of OTEC, tidal,
- Acquire the knowledge of geothermal and **Alternative energy sources**

SYLLABUS

UNIT-I
Introduction: Introduction to energy sources, reserves and estimates, global energy scenario, renewable energy -environment implications, global warming and climate change, limitations of conventional energy sources, classification of non-conventional energy sources - solar energy, wind energy, bio-energy, Ocean Thermal Energy Conversion (OTEC), tidal, geothermal and hydro.

UNIT-II
Bio-energy: Biomass and its sources, energy plantation, production of fuel wood, bio-conversion processes, bio-gas, bio-diesel and ethanol production and utilization, thermo-chemical processes, biomass gasification, process, types of reactors, utilization of producer gas for thermal and electricity generation.

UNIT-III
Ocean thermal energy conversion, tidal, geothermal: Tidal energy, wave energy, data, technology options; open and closed *Ocean thermal energy conversion* cycles, geothermal energy sources, power plant and environmental issues.

UNIT-IV
Fuel Cells: Hydrogen generation-storage, transport and utilization, applications, power generation. Fuel cells-Technologies, types, economics and power generation.

UNIT-V
Solar Energy Storage and Applications:
Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications-solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

Text Books:

1. Non-Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2006
2. Renewable Energy Resources – Twidell&Wier, CRC Press(Taylor & Francis), 2012
3. *Y. W. B. Charles*, *B.H. Essel*, *―Biomass Conversion and Technology‖*, John Wiley, Latest Edition

Reference Books:

1. Renewable energy resources by G. N. Tiwari, M. K. Ghosal, Alpha Science International, 2005.
2. Renewable Energy Technologies by R. Ramesh, K. Uday Kumar, M. Anandakrishnan, Narosa Publishing House, 1997
3. Non-Conventional Energy Systems by K Mittal, A. H. Wheeler Publishing Company Limited, 01-Jan-1999.
4. Renewable energy sources and emerging technologies by D.P.Kothari,K.C.Singhal, P.H.I.
5. Godfrey Boyle, ―Renewable Energy- Power for a Sustainable Future‖, Oxford University Press, U.K.,
6. Twidell, J.W. & Weir, A., ―Renewable Energy Sources‖, E.F.N Spon Ltd., UK.

SMART GRID TECHNOLOGIES
(Professional Elective-I)

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objective:

- To understand various aspects of smart grid
- To study various smart transmission and distribution technologies
- To appreciate distribution generation and micro grids
- To know the Elements of communication and networking for smart grid

Course Outcomes:

- Understand technologies for smart grid
- Appreciate the smart transmission as well distribution systems
- Realize the distribution generation and
- Know the Elements of communication and networking for smart grid

SYLLABUS

UNIT – I
Introduction to Smart Grids: Definition need for smart grids, smart grid conceptual model, Difference between conventional & smart grid, Role of Smart grids. Smart grid economic and environmental benefits

UNIT – II:
Monitoring and control for transmission system: Smart Substations and their automation, Supervisory control and data acquisition (SCADA), energy management system (EMS), phasor measurement units (PMU), Wide area measurement systems (WAMS)

UNIT – III
Smart Distribution Technologies: Distribution automation, automated meter reading (AMR), fault location isolation and service restoration (FLISR), Outage Management Systems (OMS), Energy Storage, Renewable Integration

UNIT – IV
Micro grids and Distributed energy resources: Concept of micro grid, need & applications of micro grid, formation of micro grid, issues of interconnection, protection & control of micro grid.
Distributed energy resources (DERs): Small scale distributed generation, Distributed Generation Technology, Micro turbines, Fuel Cells, Solar Photovoltaic, Solar thermal, Wind power, Advantages and disadvantages of DG.

UNIT – V
Elements of communication and networking:

Local Area Network (LAN) - House Area Network (HAN) - Wide Area Network (WAN) - Broadband over Power line (BPL) - IP based Protocols - Basics of web service and CLOUD Computing, Cyber Security for Smart Grid.

Text Books:

1. Clark W Gellings, "The Smart Grid, Enabling Energy Efficiency and Demand Side Response"- CRC Press, 2009.
2. Jean Claude Sabonnadière, Nouredine Hadjsaïd, "Smart Grids", Wiley-ISTE, IEEE Press, May 2012
3. Tony Flick and Justin Morehouse, "Securing the Smart Grid", Elsevier Inc.

Reference Books:

1. James Momoh, "Smart Grid: Fundamentals of Design and Analysis" – Wiley, IEEE Press, 2012.
2. Janaka Ekanayake, Kithsiri Liyanage, Jianzhong. Wu, Akihiko Yokoyama, Nick Jenkins, "Smart Grid: Technology and Applications"- Wiley, 2012.
3. Stuart Borlase , Smart Grid: Infrastructure, Technology and Solutions, CRC Press 2012.
4. Mini S. Thomas, John D McDonald, Power System SCADA and Smart Grids, CRC Press, 2015
5. Kenneth C.Budka, Jayant G. Deshpande, Marina Thottan, Communication Networks for Smart Grids, Springer, 2014.
6. Ali K., M.N. Marwali, Min Dai, "Integration of Green and Renewable Energy in Electric Power Systems", Wiley.

AI TECHNIQUES
(Professional Elective-II)

B.Tech VII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To study various methods of AI
- To study the models and architecture of artificial neural networks.
- To study the ANN paradigms**.**
- To study the fuzzy sets and operations and fuzzy logic systems.
- To study the applications of AI.

Course Outcomes

- Compare human brain and computer and learn different AI Techniques
- Understand the basic concepts, models training algorithms and applications of artificial neural networks CO 3
- Explain the basic concepts of fuzzy and classical sets and fuzzy logic system components
- Model an intelligent system from the concepts of NN & Fuzzy logic and understand their applications

SYLLABUS

UNIT–I

Fundamentals of Neural Networks: Introduction to artificial intelligence systems, Humans and Computers. Organization of the Brain – Biological Neuron – Biological and Artificial neuron Models, MC Culloch-pitts neuron model, Activation functions, Learning process, Learning rules, neural network architectures- Single-layer feed-forward networks: – Perceptron, Learning algorithm for perceptron- limitations of Perceptron model

Unit–II

Multilayer feed forward Neural Networks: Derivation of Back propagation (BP) Training, Radial Basis Function (RBF) Neural Network – Kohonen Self Organising feature Map (KSOM). Architecture of Hopfield Network

UNIT – III

Classical and Fuzzy Sets: Introduction to classical sets – properties – Operations and relations – Fuzzy sets – Membership – Uncertainty – Operations – Properties – Fuzzy relations – Cardinalities – Membership functions.

Fuzzy Logic System Components: Fuzzification – Membership value assignmen – Development of rule base and decision making system – Defuzzification to crisp sets – Defuzzification methods – Basic hybrid system.

UNIT IV

Genetic Algorithms and Genetic modeling: Introduction-Encoding – fitness function-Reproduction operators – Genetic Modeling – genetic operators – crossover – single site crossover – two point crossover – multipoint crossover – uniform crossover – matrix crossover – crossover rate – inversion & deletion – mutation operator – mutation – mutation rate – Bit wise operator – Generational Cycle – Convergence of Genetic Algorithm

UNIT–V:

Application of AI techniques: Load forecasting – Economic load dispatch – Reactive power control – Speed control of dc and ac motors.

Text Books:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by S.Rajasekaran and G.A. Vijayalakshmi Pai – PHI Publication.
2. Fuzzy logic with fuzzy applications- by T.J. Ross, TMH.

Reference Books:

1. Introduction to Artificial Neural Systems – Jacek M. Zurada, Jaico Publishing House, 1997.
2. Fundamentals of Neural Networks Architectures, Algorithms and Applications - by laurene Fausett, Pearson.
3. Neural Networks, Algorithms, Applications and programming Techniques by James A. Freeman, David M. Skapura.
4. Introduction to Neural Networks using MATLAB 6.0 by S N Sivanandam, S Sumathi, S N Deepa TMGH

UTILIZATION OF ELECTRICAL ENERGY

B.Tech VIII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the operating principles and characteristics of traction motors with respect to speed, temperature, loading conditions.
- To acquaint with the different types of heating and welding techniques.
- To study the basic principles of illumination and its measurement.
- To understand different types of lightning system including design
- To understand the basic principle of electric traction including speed–time curves of different traction services and calculation of different parameters.

Course Outcomes:

- Able to identify a suitable motor for electric drives and industrial applications
- Able to identify most appropriate heating or welding techniques for suitable applications.
- Able to understand various level of illuminosity produced by different illuminating sources.
- Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
- Able to determine the speed/time characteristics of different types of traction motors and estimate energy consumption levels

SYLLABUS

UNIT-I
Electric Drives: Selection of motor, steady state and transient characteristics, Applications of electric drives, Types of industrial loads- continuous–Intermittent and variable loads.

UNIT-II:
Electric Heating and Welding: Advantages and methods of electric heating–Resistance heating, induction heating and dielectric heating. Resistance welding and arc welding, Electric welding equipment.

UNIT-III
Illumination : Introduction, terms used in illumination, Laws of illumination, Sources of light, Mercury Vapor lamps and Sodium Vapor lamps, Discharge lamps, LED lamps, Types of lighting, flood lighting, LED lighting, street lighting.

UNIT- IV

Electric Traction - I: Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed– time curves for different services – Trapezoidal and quadrilateral speed time curves-High speed transportation trains.

UNIT-V

Electric Traction – II: Calculations of tractive effort– power –Specific energy consumption for given run–Effect of varying acceleration and braking retardation–Adhesive weight and braking, retardation adhesive weight and coefficient of adhesion–Principles of energy efficient motors-Modern traction motors.

Text Books:

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, DhanpatRai&Sons.

Reference Books:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.

POWER ELECTRONIC CONTROL OF ELECTRIC DRIVES
(Professional Elective-III)

B.Tech VIII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the concept of drive and multi-quadrant operation of drive.
- It covers in detail the basic and advanced speed control techniques using power electronic converters that are used in industry.
- To understand the operation of Rectifier and Chopper fed DC drives.
- Describes the slip power recovery schemes in induction motors and operation of AC drives.

Course Outcomes:
Upon the completion of this course, the student will be able to

- Identify different electric drive system.
- Understand the operation of rectifier fed DC drives, chopper fed DC drives and closed loop control of DC motor.
- Analyse the slip power recovery schemes of Induction motor and speed control of converter fed induction motor & synchronous motor.
- Evalute the performance of speed control of synchronuous motor by CSI and VSI.

SYLLABUS

Unit I
Basics of Electric Dives: Definition, Advantages and applications of drives, Components of electric drive system, Difference between DC and AC drives, Multi quadrant operation of drive, fundamental torque equation and components of torque, load equalization, Speed control methods of DC motors and Induction motor, Electric Braking.

Unit II
Rectifier Control of DC Motor Drives: Single Phase Fully controlled converters connected to DC separately excited motor and DC series motor – Continuous & Discontinuous current operation – voltage and current waveforms – Speed Torque expressions – Speed Torque Characteristics.

Unit III
Chopper Control of DC Motor Drives: Chopper controlled DC separately excited motor and DC series motor – Continuous current operation – voltage and current waveforms – Speed Torque expressions – Speed Torque characteristics, Closed loop control of DC drive (Only Block Diagram).

Unit IV
Control of Induction Motors: Variable voltage control of Induction motor by AC voltage controller, Variable frequency control of Induction motor – waveforms – Speed Torque characteristics, Slip power recovery schemes – Static Kramer Drive – Static Scherbius Drive.

Unit V

Control of Synchronous Motors: Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI and Load commutated CSI fed Synchronous Motor – Operation – Waveforms – Speed Torque characteristics.

Text Books:

1. Fundamentals of Electrical Drives by G.K.Dubey, Second Edition, 2002.
2. Power Electronics: Circuits, Devices and Applications by M.H.Rashid, Third Edition, 2009.
3. P.S. Bimbhra, ― Power Electronics‖, 4th Edition, Khanna publishers. 2010

Reference Books:

1. Power Electronics by M.D.Singh and K.B.Khanchandani, Second Edition, 2017.
2. Modern Power Electronics and AC Drives by Bimal K Bose, 2005.
3. Thyristor Control of Electric Drives by Vedam Subramanyam, Tata McGraw-Hill Publications,
2008.

INSTRUMENTATION
(Professional Elective IV)

B.Tech VIII Semester

L	T	P	C
3	0	0	3

Course Objectives:

- To study the basics of measuring system.
- To study various Electrical transducers and to measure the various types of Non–electrical quantities
- To study various types of digital voltmeters
- To study the working principles of various types of oscilloscopes and their applications.
- To study various types of signal analyzers

Course Outcomes:

- Able to study the basics of measuring system.
- Acquire proper knowledge to use various types of Transducers and able to monitor and measure various parameters such as strain, Fow, temperature and pressure
- Acquire proper knowledge and working principle of various types of digital voltmeters.
- Able to measure various parameters like phase and frequency of a signal with the help of CRO.
- Acquire proper knowledge and able to handle various types of signal analyzers.

SYLLABUS

UNIT-I

Basics of Measuring System: Measuring Systems, Performance Characteristics – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors and Random Errors, Statistical analysis of random errors.

UNIT-II

Transducer Basics and Applications: Definition of transducers – Classification of transducers – Advantages of Electrical transducers –Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers. Measurement of Temperature, Pressure, Strain and Flow.

UNIT-III

Digital Voltmeters: Digital voltmeters – Successive approximation, ramp, dual–Slope integration continuous balance type – Microprocessor based ramp type DVM, digital frequency meter – Digital phase angle meter.

UNIT-IV

Oscilloscope: Cathode ray oscilloscope – Time base generator – Horizontal and vertical amplifiers – Measurement of phase and frequency – Lissajous patterns – Sampling oscilloscope, data logger, Transient recorder.

UNIT-V

Signal Analyzers: Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays – Vector impedance meter – Q meter – Peak reading and RMS voltmeters

Text Books:

1. Electronic Instrumentation–by H.S.Kalsi Tata MCGraw–Hill Edition, 1995.
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpatrai & Co

Reference Books:

1. Measurement and Instrumentation theory and application, Alan S.Morris and Reza Langari, Elsevier
2. Measurements Systems, Applications and Design – by D O Doeblin
3. Principles of Measurement and Instrumentation – by A.S Morris, Pearson/Prentice Hall ofIndia
4. Modern Electronic Instrumentation and Measurement techniques – by A.D HelfrickandW.D.Cooper, Pearson/Prentice Hall of India.
5. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.

ADVANCED CONTROL SYSTEMS
(Professional Elective-IV)

B.Tech VIII Semester

L	T	P	C
3	0	0	3

Course Objective:

- Review of the state space representation of a control system: Formulation of different models from the signal flow graph, diagonalization.
- To introduce the concept of controllability and observability. Design by pole placement technique.
- Analysis of a nonlinear system using Describing function approach and Phase plane analysis.
- The Lypanov's method of stability analysis of a system &Formulation of Euler Laugrange equation
- Formulation of linear quadratic optimal regulator (LQR) problem by parameter adjustment and solving riccatti equation.

Course Outcomes:

- State space representation of control system and formulation of different state models are reviewed.
- Able to design of control system using the pole placement technique is given after introducing the concept of controllability and observability.
- Able to analyse of nonlinear system using the describing function technique and phase plane analysis.
- Able to analyse the stability analysis using lypnov method& Minimization of functionals using calculus of variation studied.
- Able to formulate and solve the LQR problem and riccatti equation.

SYLLABUS

UNIT-I
State space analysis: State Space Representation – Solution of state equation – State transition matrix, –Canonical forms – Controllable canonical form – Observable canonical form, Jordan Canonical Form

UNIT-II
Controllability, observability and design of pole placement: Tests for controllability and observability for continuous time systems – Time varying case – Minimum energy control – Time invariant case – Principle of duality Controllability and observability form Jordan canonical form and other canonical forms – Effect of state feedback on controllability and observability – Design of state feedback control through pole placement.

UNIT-IIIDescribing function analysis: Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase–plane analysis.

Stability analysis: Stability in the sense of Lyapunov – Lyapunov's stability and Lypanov's instability theorems – Direct method of Lypanov for the linear and nonlinear continuous time autonomous systems.

UNIT-IV

Calculus of variations: Minimization of functional of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality constraints – Euler lagrangine equation.

UNIT-V

Optimal control: Linear quadratic optimal regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Lyapunov method) – Optimal regulator design by continuous time algebraic riccatti equation (CARE) – Optimal controller design using LQG framework.

Text Books:

1. Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998
2. Automatic Control Systems by B.C. Kuo, Prentice Hall Publication

Reference Books:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996
2. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.
3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw– Hill Companies, 1997.
4. Systems and Control by Stainslaw H. Zak , Oxford Press, 2003.
5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications.

POWER QUALITY
(Open Elective IV)

B.Tech VIII Semester

L	T	P	C
2	0	0	2

Course Objective:

- To introduce the power quality problem
- To educate on production of voltages sags, over voltages and harmonics and methods of control.
- To study overvoltage problems
- To study the sources and effect of harmonics in power system
- To impart knowledge on various methods of power quality monitoring.

Course Outcome:

At the end of this course the student should be able to

- Differentiate between different types of power quality problems.
- Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- Analyze power quality terms and power quality standards.
- Explain the principle of voltage regulation and power factor improvement methods.
- Explain the power quality monitoring concepts and the usage of measuring instruments.

SYLLABUS

Unit-I
Introduction to Power Quality: Terms and definitions of transients, Long Duration Voltage Variations: under Voltage, Under Voltage and Sustained Interruptions; Short Duration Voltage Variations: interruption, Sag, Swell; Voltage Imbalance; Notching D C offset; waveform distortion; voltage fluctuation; power frequency variations.

Unit-II
Voltage Sag: Sources of voltage sag: motor starting, arc furnace, fault clearing etc; estimating voltage sag performance and principle of its protection; solutions at end user level- Isolation Transformer, Voltage Regulator, Static UPS, Rotary UPS, and Active Series Compensator.

Unit-III
Electrical Transients: Sources of Transient Over voltages- Atmospheric and switching transients motor starting transients, pf correction capacitor switching transients, ups switching transients, neutral voltage swing etc; devices for over voltage protection.

Unit-IV
Harmonics: Causes of harmonics; current and voltage harmonics, measurement of harmonics, THD; effects of harmonics on – Transformers, AC Motors, Capacitor Banks, Cables, and

Protection Devices, Energy Metering, Communication Lines etc. harmonic mitigation techniques.

Unit-V

Monitoring and Instrumentation: Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application
of intelligent systems – PQ monitoring standards.

Text Books:

1. Roger C Dugan, McGrahan, Santoso & Beaty, “Electrical Power System Quality” McGraw Hill
2. Arinthom Ghosh & Gerard Ledwich, “Power Quality Enhancement Using Custom Power Devices” Kluwer Academic Publishers
3. Sankaran, “ Power Quality” CRC Press.

Reference Books:

1. Power Quality Primer, Kennedy B W, First Edition, McGraw–Hill, 2000.
2. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press; 2000.
3. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.
4. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.
5. Harmonics and Power Systems –Franciso C.DE LA Rosa–CRC Press (Taylor & Francis)

Power Quality in Power systems and Electrical Machines–EwaldF.fuchs, Mohammad A.S. Masoum–Elsevier.

OPEN ELECTIVE – IV

(B).ADVANCED DRAWING FOR CIVIL ENGINEERING

VIII SEMESTER

Lecture: 3	Practical: 0	Internal Marks:30
Credits: 3	Tutorial: 0	External Marks: 70

Course Objectives:

The objective of this course is:
1. Draw different views of culverts.
2. Draws different views of T. Beam bridge
3. Draws the component parts of Public health Engineering works
4. Draws the different views of irrigation Engineering structures
5. Computer aided drawing of various irrigation structures

Course Outcomes:

Upon the successful completion of this course, the students will be able to:
1.Able to Draw different views of culverts.
2. Able to Draws different views of T. Beam bridge
3.Able to Draws the component parts of Public health Engineering works
4.Able to Draws the different views of irrigation Engineering structures
5. Able to Draft some irrigation structures with basic principles

SYLLABUS

Unit 1: Simple Culvert

Draw the plan, cross-sectional elevation and longitudinal sectional elevation of
- Pipe culvert (Single Pipe)
- R.C.C slab culvert with splayed wings

Unit 2: Bridges.

- Two-Span R.C.C T-beam bridge with square return walls.
- Two-Span R.C.C T-beam bridge with splayed wing walls and Returns walls.

Unit 3: Public health engineering drawings.

- Sanitary block of a large building showing internal water supply and sanitary fittings and plumbing fixtures (Plan & Section across each unit)
- Water supply and Sanitary connections to a residential building.
- R.C.C overhead square tank.(four columns with accessories).

Unit 4: Irrigation engineering drawings

- Earthen bunds –a) Homogeneous b) Non-Homogeneous (Zoned embankment)
- Surplus weir with splayed wing walls.
- Tank sluice with tower head.

Unit 5: Computer Aided drawing of Irrigation structures

- Surplus weir with splayed wing walls.
- Tank sluice with tower head.

TEXT BOOKS & REFERENCES:

1. Water Resources Engineering Principles and Practices by Satya Narayana Murthy Challa.
2. Civil Engineering Drawing by A. Kamala.
3. Civil Engineering Drawing by Chakraborthy.

B. Tech VII Semester

	L	T	P	C
	3	0	0	3

18EC7T10-BIO MEDICAL ENGINEERING
(OPEN ELECTIVE-III)

COURSE OBJECTIVES

1. To introduce student to basic biomedical engineeringtechnology
2. To understand the anatomy & physiology of major systems of the body in designing equipment for medicaltreatments.
3. To impart knowledge about the principle and working of different types of bio-medical electronic equipment/devices.

COURSE- OUTCOMES: After Going Through This Course the Student Will

1. To understand diagnosis and therapy relatedequipments.
2. To understand the problem and identify the necessity of equipment for diagnosis and therapy.
3. To understand the importance of electronics engineering in medicalfield.
4. To understand the importance of telemetry in patientcare
5. To know the Diagnostic Techniques

UNIT-1:

INTRODUCTION TO BIOMEDICAL INSTRUMENTATION:Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Envoked Responses.

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, Examples of Electrodes, Basic Transducer Principles, Biochemical Transducers, The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sound, Plethysmography.

MEASUREMENTS IN THE RESPIRATORY SYSTEM: The Physiology of The Respiratory System, Tests and Instrumentation for The Mechanics of Breathing, Respiratory Therapy Equipment.

UNIT-IV:

PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.

THERAPEUTIC AND PROSTHETIC DEVICES: Audiometers and Hearing Aids, Laparoscope, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention,

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring.

B. Tech VII Semester

L	T	P	C
3	0	0	3

18EC7T10-BIO MEDICAL ENGINEERING
(OPEN ELECTIVE-III)

COURSE OBJECTIVES

1. To introduce student to basic biomedical engineeringtechnology
2. To understand the anatomy & physiology of major systems of the body in designing equipment for medicaltreatments.
3. To impart knowledge about the principle and working of different types of bio-medical electronic equipment/devices.

COURSE- OUTCOMES: After Going Through This Course the Student Will

1. To understand diagnosis and therapy relatedequipments.
2. To understand the problem and identify the necessity of equipment for diagnosis and therapy.
3. To understand the importance of electronics engineering in medicalfield.
4. To understand the importance of telemetry in patientcare
5. To know the Diagnostic Techniques

UNIT-1:

INTRODUCTION TO BIOMEDICAL INSTRUMENTATION:Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Envoked Responses.

UNIT-II:

ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, Examples of Electrodes, Basic Transducer Principles, Biochemical Transducers, The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III:

CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sound, Plethysmography.

MEASUREMENTS IN THE RESPIRATORY SYSTEM: The Physiology of The Respiratory System, Tests and Instrumentation for The Mechanics of Breathing, Respiratory Therapy Equipment.

UNIT-IV:

PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.

THERAPEUTIC AND PROSTHETIC DEVICES: Audiometers and Hearing Aids, Laparoscope, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention,

UNIT-V:

DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring.

Text Books:

1. Bio-Medical Electronics and Instrumentation‖, Onkar N. Pandey, Rakesh Kumar, Katson Books.
2. Bio-Medical Instrumentation‖, Cromwell , Wiebell, Pfeiffer

References

1. Introduction to Bio-Medical Equipment Technology‖, 4th Edition, Joseph J. Carr, John M. Brown, Pearson Publications.
2. Hand Book of Bio-Medical Instrumentation‖, Instrumentation‖, Kandahar. McGraw-Hill

B. Tech VII Semester

L	T	P	C
3	0	0	3

18EC7T11-NANO ELECTRONICS
(OPEN ELECTIVE-III)

COURSE OBJECTIVE: This course is intended to cover basics of electronics, transistor, band structure models, nanocapacitors, coulomb blockade, single electron transistor and nanophotonics.

COURSE OUTCOME of the study: After Going Through This Course the Student Will

1. To know nanoelectronics holds the capacity for mass production of high-quality nanodevices with an enormous variety of applications from computers to biosensors, from cell phone to space shuttles and from large display screens to small electronic toys.
2. To know the scaling of transistors and other devices to smaller and smaller sizes, which has provided the basis for this exponential growth, has limits, physical (size of the atoms), technological (lithography) and economic, which will be reached by nanoelectronics in the next coming decade.
3. To understand the materials of nanoelectronics
4. To know Ballistic and Diffusive Transport
5. To understand the concept of quantum dots

UNIT-I

Basics of nano linear optics and electronics**.**Free Electron Theory & The New Ohm‘s Law: Why Electrons flow, Classical free electron theory, Sommerfeld's theory, The quantum of conductance, Coulomb blockade, Towards Ohm‘s law. The Elastic Resistor: Conductance of an Elastic Resistor, Elastic Resistor- Heat dissipation.

Unit-II:

Materials for nanoelectronics: Semiconductors, Crystal lattices: bonding in crystals, Electron energy bands, Semiconductor heterostructures , Lattice-matched and pseudomorphicheterostructures Inorganic nanowires, Organic semiconductors , Carbon nanomaterials: nanotubes and fullerenes

UNIT-III:

Ballistic and Diffusive Transport: Ballistic and Diffusive Transfer Times, Channels for Conduction Conductivity, Conductivity: E(p) or E(k) Relations, Counting States, Drude Formula, Quantized Conductance, Electron Density - Conductivity

Unit-IV:

Electron transport in semiconductors and nanostructures Time and length scales of the electrons in solids, Statistics of the electrons in solids and nanostructures, Fermi statistics for electrons, the density of states of electrons in nanostructures, Electron transport in nanostructures.

Unit - V:

Electrons in traditional low-dimensional structures Electrons in quantum wells: Single modulation-doped heterojunctions, Numerical analysis of a single heterojunction, Control of charge transfer, Electrons in quantum wires, Electron transport in quantum wires, Electrons in quantum dots .

TEXT BOOK:

1. Introduction to Nano Science and Technology by S.M. Lindsay.
2. Supriyo Dutta -Lessons from Nanoscience: A Lecture Note Series, World Scientific (2012).

REFERENCE

1. Michael Wilson, KamaliKannangara, Geoff Smith, Michelle Simmons and Burkhard
2. Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002

COMPUTER ORGANIZATION & ARCHITECTURE

Open Elective III

Lecture: 2	Practical: 0	Internal Marks: 30
Credits: 2	Tutorial: 0	External Marks: 70

PREREQUISITES: -DLD

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

1. Understand the architecture of a modern computer with its various processing units.

2. Understand RTL, micro operations, instruction cycle

3. Understand the features of hardwired and micro programmed control units.

4. Analyze the memory hierarchy system and performance improvement by cache memory.

5. Analyze the communication methods of I/O devices and standard I/O interfaces.

SYLLABUS:

UNIT I:

Basic Structure of Computers: Computer Types, Functional unit, Basic Operational concepts, Bus structures, Data Representation: Data types, Complements, Fixed Point Representation. Floating – Point Representation. Other Binary Codes, Error Detection codes. Performance, The history of computer development.

UNIT II:

Register Transfer Language And Micro Operations: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shiftmicro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Register, Computer instructions, Timing and control, Instruction cycle, Memory – Reference Instructions. Input –Output and Interrupt.

UNIT III :

Central Processing Unit: Stack Organization**,** Instruction formats, Addressing modes, Data Transfer and Manipulation Instructions, Program control Instructions.

Control Unit: Control Memory, Hard wired control, Micro programmed control and Micro Instruction Format, Address Sequencing, Design of Control Unit.

UNIT IV:

Memory Organization:

Memory Hierarchy, Primary Memory, Introduction to Secondary Memory, Associative Memory, Cache Memory, virtual Memory, Memory Management hardware.

UNIT V:

PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access, IOP, Serial Communication.

TEXT BOOKS

1.M.Morris Mano, ―Computer Systems Architecture, Pearson Education publishers, 3rd edition.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, ―Computer Organization, TMH publications, 5th edition, 2002.

REFERENCE BOOKS:

1. William Stallings, ―Computer Organization and Architecture, Pearson/PHI publishers, 6th edition, 2004.
2. Andrew S. Tanenbaum, ―Structured Computer Organization, Pearson/PHI publishers, 4th edition, 2005.
3.John D Carpinelli, ―Computer Systems Organization and Architecture‖, Pearson Education, 1st edition, 2001

OPEN ELECTIVE – III

A) REMOTE SENSING AND GIS

VII SEMESTER

Lecture:3	Tutorial: -	Internal Marks	30
Credits:3		External Marks	70

Course Objectives:

The course is designed to:

1. Introduce the basic principles of Remote Sensing and GIS techniques.
2. Learn various types of sensors and platforms
3. learn concepts of visual and digital image analyses
4. Understand the principles of spatial analysis
5. Appreciate application of RS and GIS to Civil engineering

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Be familiar with ground, air and satellite based sensor platforms.
2. Interpret the aerial photographs and satellite imageries
3. Create and input spatial data for GIS application
4. Apply RS and GIS concepts in water resources engineering

SYLLABUS

UNIT – I: Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems. Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT.

UNIT – II: **Image analysis**: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT – III: Geographic Information System: Introduction, key components, application areas of GIS, map projections. Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT – IV: Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT – V: RS and GIS applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications. Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.

TEXT BOOKS

1. Bhatta B (2008), ‘Remote sensing and GIS’, Oxford University Press
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) ‘Remote Sensing and Image Interpretation’, Wiley India Pvt. Ltd., New Delhi
3. Schowenger, R. A (2006) ‘Remote Sensing’ Elsevier publishers.
4. ‘Fundamentals of Remote Sensing’ by George Joseph, Universities Press, 2013.
5. ‘Fundamentals of Geographic Information Systems’ by Demers, M.N, Wiley India Pvt. Ltd, 2013.

REFERENCES

1. ‘Remote Sensing and its Applications’ by Narayan LRA, Universities Press, 2012.
2. ‘Concepts and Techniques of Geographical Information System’ by Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006
3. ‘Introduction to Geographic Information Systems’ by Kand Tsung Chang, McGraw Hill Higher Education, 2009.
4. ‘Basics of Remote sensing & GIS’ by Kumar S, Laxmi Publications, New Delhi, 2005.
5. ‘Principals of Geographical Information Systems’ by Burrough P A and R.A. McDonnell, Oxford University Press, 1998.

OPEN ELECTIVE – III
B) GREEN BUILDINGS
VII SEMESTER

SEMESTER VII

Lecture: 2	Practical: 0	Internal Marks	: 30
Credits: 2		External Marks	: 70

Course Objectives:

The objective of this course is:

- To introduce the different concepts of green building techniques and how they may be synthesized to best fit a construction.
- To Know the importance of Green buildings
- To know and implement energy conservation and renewable resources
- To understand the knowledge of ECBC, LEED, GRIHA etc.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Able to describe the importance and necessity of green building.
- Able to suggest materials and technologies to improve energy efficiency of building.
- Able to assess a building on the norms available for green building.

SYLLABUS:

UNIT I - INTRODUCTION

Introduction of Green Buildings, Salient features of green buildings, Advantages of Green Buildings- Sustainable site selection and planning of buildings to improve comfort, day lighting, ventilation, planning for drainage.

UNIT II - ENERGY EFFICIENT BUILDINGS

Passive cooling and day lighting – Active solar and photovoltaic, building energy analysis methods, Lighting system design, Lighting economics and aesthetics, Impacts of lighting efficiency, Technological options for energy management.

UNIT III - ENERGY CONSERVATION

Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings, waste to energy management in residential complexes or gated communities.

UNIT IV - RENEWABLE ENERGY RESOURCES

Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar, windand hydro power appliances, success case studies of fully solar, wind and hydro power energies.

UNIT V – ENERGY REQUIREMENT AND GREEN BUILDING RATING SYSTEMS

Energy Conservation Building Code (ECBC) requirement for green buildings, Requirement for green rating systems - Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment (GRIHA), Building automation and building management systems.

TEXTBOOKS:

1. 'Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers', 2009
2. 'Alternative building materials and technologies' by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
3. 'Green Building Handbook' by Tomwoolley and Samkimings, 2009

REFERENCE BOOKS:

1. 'Complete Guide to Green Buildings' by Trish riley.
2. 'Non-Conventional Energy Resources' by G. D. Rai, Khanna Publishers.
3. 'Standard for the design for High Performance Green Buildings' by Kent Peterson, 2009
4. Ganesan T P, "Energy Conservation in Buildings", ISTE Professional Center, Chennai, 1999.

(Program Elective-IV)

SOFTWARE PROJECT MANAGEMENT

IV Year - I Semester **Course Code: 18CS7T08**

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1) To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2) To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
3) To understand successful software projects that support organization's strategic goals

COURSE OUTCOMES:

1) Understand the basic concepts and issues of software project management
2) Gain knowledge on effective planning and estimation of software projects.
3) Understand the importance of Risk Management in software Projects.
4) Select and employ mechanisms for tracking the software projects
5) Understand Process and Product Quality metrics

SYLLABUS

UNIT-I

Introduction: Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure.

UNIT-II

Project Approach: Software Lifecycle models, Lifecycle phases

Effort estimation: Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation

UNIT-III

Activity Planning: Activity Identification Approaches, Network planning models, Critical path analysis.

Risk Management: Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

UNIT-IV

Project Monitoring & Control, Resource Allocation: Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

Managing People &Organizing Teams: Oldham-Hackman Job characteristics model, Influence of culture

UNIT-V

Software Quality: Planning Quality, Defining Quality - ISO 9126, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality, Quality plan of ACIC project

TEXT BOOKS:

1. Software Project Management in practice, Pankaj Jalote, Pearson. (Units 1, 2, 3, 4, 5)
2. Software Project Management, Walker Royce: Pearson Education (Units 4, 5)

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA McGraw-Hill
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Quality, Ben-Menachem ,Marliss

VI Semester	L	T	P	C
	3	0	0	3

GREEN ENGINEERING SYSTEMS(18ME6T06)
(OPEN ELECTIVE-3)

UNIT - I

INTRODUCTION:

Solar Radiation: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells, I-V characteristics

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT - II

Solar Energy Storage and Applications: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling techniques, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria, types of winds, wind data measurement.

UNIT - III

Bio-Mass: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, bio-fuels, I.C. engine operation and economic aspects.

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles of utilization, setting of OTEC plants.

Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT - IV

Energy Efficient Systems:

Electrical Systems: Energy efficient motors, energy efficient lighting and control, selection of luminaire, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning), demand site management.

Mechanical Systems: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, environmental friendly and energy efficient compressors and pumps.

UNIT - V

Energy Efficient Processes: Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.

TEXT BOOKS:

1. Sukhatme S.P., & Nayak J. K., Solar Energy – Principles of Thermal Collection and Storage, TMH, 2008.
2. Khan B.H., Non-Conventional Energy Resources, Tata McGraw Hill, New Delhi, 2006.
3. Davim J. P., Green Manufacturing Processes and Systems, Springer, 2013.

REFERENCE BOOKS:

1. Jagadeesh K. S., Venkata Rama Reddy B. V., & Nanjunda Rao, K. S., Alternative Building Materials and Technologies, New Age International (P) Ltd., 2014
2. Goswami Y. D., Krieth F., & John F Kreider, Principles of Solar Engineering, CRC Press (Taylor & Francis), 2015
3. Desai A. V., Non-Conventional Energy, New Age International (P) Ltd.
4. Ramesh & Kumar, Renewable Energy Technologies, Narosa Publishing House, 1997.
5. Rai G. D., Non-conventional Energy Source, Standard Publishers, 2009.
6. Twidell J., & Weir T., Renewable Energy Resources, 2nd Edition, BSP Books Pvt. Ltd, 2006.
7. Hoogers G., Fuel Cell Technology–Hand Book, CRC Press (Taylor & Francis), 2019.

VII Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

MICRO-ELECTRO-MECHANICAL SYSTEMS(18ME7T10)

OPEN ELECTIVE-5

UNIT – I :

INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

UNIT – II :

THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, peltier effect heat pumps, thermal flow sensors, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA), U-shaped horizontal and vertical electro thermal actuator, thermally activated MEMS relay, micro spring thermal actuator, data storage cantilever.

UNIT – III:

MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS: Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch, wave guide and tuning, shear stress measurement.

MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, mag MEMS actuators, by directional micro actuator, feedback circuit integrated magnetic actuator, large force reluctance actuator, magnetic probe based storage device.

UNIT – IV :

MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectro phoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), tuning using micro fluidics, typical micro fluidic channel, microfluid dispenser, micro needle, molecular gate, micro pumps.

RADIO FREQUENCY (RF) MEMS:RF – based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

UNIT – V :

CHEMICAL AND BIO MEDICAL MICRO SYSTEMS: Sensing mechanism & principle, membrane-transducer materials, chem.-lab-on-a-chip (CLOC) chemoresistors, chemocapacitors, chemotransistors, electronic nose (E-nose), mass sensitive chemosensors, fluroscence detection, calorimetric spectroscopy.

TEXT BOOK

- MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.

REFERENCE BOOKS

- Foundation of MEMS, Chang Liu, Prentice Hall Ltd.
- MEMS and NEMS, Sergey Edwrd Lyshevski, CRC Press, Indian Edition.
- MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.
- Introductory MEMS, Thomas M Adams, Richard A Layton, Springer International Publishers.

B. Tech VI Semester

L	T	P	C
3	0	0	3

18EC6T04-INTERNET OF THINGS
(PROFESSIONAL ELECTIVE 1)

Prerequisites :Fundamentals of Computer Network, Computer Network Course

Objectives :
1. To understand what Internet of Things is.
2. To get basic knowledge of RFID Technology, Sensor Technology and Satellite Technology.
3. To make students aware of resource management and security issues in Internet of Things.

Course Outcomes : At the end of this course, students will be able to:

1. Explain what Internet of Thins is.
2. Describe key technologies in Internet of Things.
3. Understand wireless sensor network architecture and its framework along with WSN applications.
4. Explain resource management in the Internet of Things.
5. Explain Internet Of Things Privacy, Security And Governance

UNIT - I INTRODUCTION
What is the Internet of Things? : History of IoT, About IoT, Overview and Motivations, Examples of Applications, Internet of Things Definitions and Frameworks : IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities

UNIT - II FUNDAMENTAL IoT MECHANISMS AND KEY TECHNOLOGIES
Identification of IoT Objects and Services, Structural Aspects of the IoT, Environment Characteristics, Traffic Characteristics, Scalability, Interoperability, Security and Privacy, Open Architecture, Key IoT Technologies, Device Intelligence, Communication Capabilities, Mobility Support, Device Power, Sensor Technology, RFID Technology, Satellite Technology.

UNIT - III RADIO FREQUENCY IDENTIFICATION TECHNOLOGY RFID:
Introduction, Principle of RFID, Components of an RFID system, Issues EPCGlobal Architecture Framework: EPCIS & ONS, Design issues, Technological challenges, Security challenges, IP for IoT, Web of Things. Wireless Sensor Networks: History and context, WSN Architecture, the node, Connecting nodes, Networking Nodes, Securing Communication WSN specific IoT applications, challenges: Security, QoS, Configuration, Various integration approaches, Data link layer protocols, routing protocols and infrastructure establishment.

UNIT - IV RESOURCE MANAGEMENT IN THE INTERNET OF THINGS
Clustering, Software Agents, Clustering Principles in an Internet of ThingsArchitecture, Design Guidelines, and Software Agents for Object Representation, Data Synchronization. Identity portrayal, Identity management, various identity management models: Local, Network, Federated and global web identity, user-centric identity management, device centric identity management and hybrid-identity management, Identity and trust.

UNIT - V INTERNET OF THINGS PRIVACY, SECURITY AND GOVERNANCE
Vulnerabilities of IoT, Security requirements, Threat analysis, Use cases and misuse cases, IoT security

tomography and layered attacker model, Identity establishment, Access control, Message integrity, Non-repudiation and availability, Security model for IoT.

Text Books

1. Daniel Minoli, ―Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications‖, ISBN: 978-1-118-47347-4, Willy Publications
2. Bernd Scholz-Reiter, Florian Michahelles, ―Architecting the Internet of Things‖, ISBN 978-3- 642-19156-5 e- ISBN 978-3-642-19157-2, Springer

Reference Books

1. HakimaChaouchi, ― The Internet of Things Connecting Objects to the Web‖ ISBN : 978-1- 84821-140-7, Willy Publications
2. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, ISBN: 978-1-119-99435-0, 2 nd Edition, Willy Publications

VII Semester

	L	T	P	C
	3	0	0	3

MECHATRONICS(18ME7T09)

OPEN ELECTIVE-5

UNIT – I

Introduction: Definition of Mechatronics, Need for Mechatronics in Industry, Objectives of mechatronics, mechatronics design process, Mechatronics key elements, mechatronics applications – Computer numerical control (CNC) machines, Tool monitoring systems, Flexible manufacturing system (FMS), Industrial Robots, Automatic packaging systems, Automatic inspection systems.

UNIT – II

Sensors: Static characteristics of sensors, Displacement, Position and Proximity sensors, Force and torque sensors, Pressure sensors, Flow sensors, Temperature sensors, Acceleration sensors, Level sensors, Light sensors, Smart material sensors, Micro and Nano sensors, Selection criteria for sensors.

UNIT – III

Actuators: Mechanical, Electrical, Hydraulic and Pneumatic Actuation systems, Characteristics and their limitations, Design of Hydraulic and Pneumatic circuits, Piezoelectric actuators, Shape memory alloys, Selection criteria for actuators.

UNIT – IV

Microprocessors, Microcontrollers and Programmable Logic Controllers: Architecture of Microprocessor, Microcontroller and Programmable Logic Controller, PLC Programming using ladder diagrams, logics, latching, sequencing, timers relays and counters, data handling, Analog input/output, selection of controllers.

UNIT – V

Micro Electro Mechanical Systems (MEMS): History, Effect of scaling, Fabrication Techniques: Oxidation, Physical Vapor disposition, Chemical Vapor Deposition, Lithography, Etching, Wafer bonding, LIGA, DRIE, Applications: Lab on chip.

Text books:

1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering , WBolton, 3/e Pearson Education Press, 2005.
2. Devadas Shetty and Richard A Kolk, Mechatronic System Design, 2/e, Cengage learning, 2010.
3. Clarence W. de Silva, Mechatronics an Integrated Approach, CRC Press, 2004.
4. James J Allen, Micro Electro Mechanical Systems Design, CRC Press Taylor & Francis group, 2005.
5. Ganesh S Hedge, Mechatronics, Jones & Bartlett Learning, 2010.

B. Tech VII Semester

	L	T	P	C
	3	0	0	3

18EC7T06-SATELLITE COMMUNICATION
(Professional Elective III)

COURSE OBJECTIVES
The student will be introduced to:
1. Understand the concepts, applications and subsystems of Satellite communications.
2. Derive the expression for G/T ratio and to solve some analytical problems on satellite link design
3. Understand the concepts of satellite navigation, architecture and applications of GPS.

COURSE OUTCOMES
At the end of this course the student can able to:
1. Understand the basic concepts, applications, frequencies used and types of satellite communications.
2. Understand the concept of look angles, launches and launch vehicles and orbital effects in satellite Communications.
3. Understand the various satellite subsystems and its functionality.
4. Understand the concepts of satellite link design and calculation of C/N ratio.
5. Understand the concepts of multiple access and various types of multiple access techniques in satellite Systems.

UNIT I
INTRODUCTION: Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications.
ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics, Look Angle determination, Orbital perturbations, orbital elements, launches and launch vehicles, Orbital effects in communication systems performance. **UNIT II**
SATELLITE SUBSYSTEMS: Attitude and orbit control system, telemetry, tracking, Command and Monitoring, power systems, communication subsystems, Satellite antenna, Equipment reliability and Space qualification.
UNIT III
SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.
UNIT IV
MULTIPLE ACCESS: Frequency division multiple access (FDMA) Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA, DAMA, Code Division Multiple access (CDMA), Spread spectrum transmission and reception.
UNIT V
SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPSNavigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS:
1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES:
1. Satellite Communications: Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.

B. Tech VIII Semester

L	T	P	C
3	0	0	3

18EC8T06-SOFT COMPUTING TECHNIQUES

OPEN ELECTIVE IV

COURSE OBJECTIVES:

1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.
3. Understand Soft Computing concepts, technologies, and applications.
4. Understand the underlying principle of soft computing with its usage in various application.
5. Understand different soft computing tools to solve real life problems.

COURSE OUTCOMES:

Upon completion of the course, the student is expected to

1. Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
2. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
3. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
4. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
5. Reveal different applications of these models to solve engineering and other problems.

UNIT –I

Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, and Knowledge representation - Expert systems.

UNIT –II

Artificial Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network.

UNIT-III

Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT –IV

Fuzzy Logic System: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT –V

Genetic Algorithm: Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search techniques for solving optimization problems, Applications.

TEXT BOOKS:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCE BOOKS:

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. & Folger T.A., Prentice-Hall of India Pvt. Ltd.,
2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994..

Sl.NO	Name of the programme	Name of the Course	Course Code	Year of introduction (during the last five years)
1	B.Tech Mechanical Engineering	Numerical Methods and Vector Calculus	20ME3T01	2021-22
2	B.Tech Mechanical Engineering	Material Science & Metallurgy	20ME3T02	2021-22
3	B.Tech Mechanical Engineering	Complex Variables and Statistical Methods	20ME4T01	2021-22
4	B.Tech Mechanical Engineering	Kinematics of Machinery	20ME4T04	2021-22
5	B.Tech Mechanical Engineering	Managerial Economics & Financial Analysis	20ME4T05	2021-22
6	B.Tech Mechanical Engineering	Proficiency Through Reading & Writing Lab	20ME4L06	2021-22
7	B.Tech Mechanical Engineering	Programming through MATLAB	20ME4S09	2021-22
8	B.Tech Mechanical Engineering	Operational Research	18ME7T02	2021-22
9	B.Tech Mechanical Engineering	Mini project	18ME7P13	2021-22
10	B.Tech Mechanical Engineering	Mechanical Vibrations	18ME8T01	2021-22
11	B.Tech Mechanical Engineering	Non Destructive Evaluation	18ME8T03	2021-22
12	B.Tech Mechanical Engineering	MOOCS	18ME8S19	2021-22

B.TECH III SEMESTER **BSC**

L	T	P	C
3	0	0	3

20ME3T01 **NUMERICAL METHODS AND VECTOR CALCULUS**

Pre-requisite: Linear Algebra and Differential Equations & Transformation Techniques

Course Objective: Objective of the course is to impart

- understand the basic numerical methods to solve simultaneous linear equations
- knowledge of numerical methods to solve ordinary differential equations
- the types of integration over the lines, surfaces & volumes

Course Outcomes:

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

CO1: Determine the solution of transcendental equations by different numerical methods

CO2: Provide the interpolation techniques which analyze the data of an unknown function

CO3: Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries

CO4: Evaluate areas and volumes using double & triple integrals

CO5: Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.

SYLLABUS

UNIT-I: Numerical Solution of Equations:

Solution of Algebraic and transcendental equations: Bisection method, Method of false position and Newton-Raphson method. Iterative methods of solution of linear simultaneous equations: Jacobi's and Gauss-Seidel iteration methods.

UNIT-II: Interpolation:

Forward and backward, relation between these operators, Differences of a polynomial, Interpolation with unequal intervals: Lagrange's interpolation formula, Newton's forward & backward interpolation formulae & problems.

UNIT-III: Numerical Integration & Numerical Solutions of ordinary differential equations with initial conditions:

Numerical Integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th rules.

Numerical Solution of ODE: Picard's method, Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta method of 4^{th} order.

UNIT-IV: Multiple Integrals:

Double integrals in Cartesian & polar coordinates, Change of order of integration, Triple integrals, Change of variables (Cartesian to Polar, Rectangular coordinates to Cylindrical & Rectangular coordinates to Spherical polar coordinate systems). **Applications:** Area enclosed by plane curves, Volume of solids.

UNIT-V: Vector Differentiation & Vector Integration:

Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, directional derivatives, Del applied to vector point functions-Div& Curl, physical interpretation of div & curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).Line integral, Green's theorem in the plane (without proof), Surface integrals, Stoke's theorem (without proof), Volume integral, Gauss Divergence theorem (without proof).

Text Books:

B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.

B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.

N. P. BALI &Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH III SEMESTER

PCC	L	T	P	C
	3	0	0	3

20ME3T02 MATERIAL SCIENCE & METALLURGY

SYLLABUS

UNIT - I

Structure of Metals and Constitution of alloys: Bonds in Solids, Crystal structure of metals, grains and grain boundaries, determination of grain size and effect of grain size on the mechanical properties of metal / alloys. Necessity of alloying, types of solid solutions, Hume Rothery's rules.

UNIT -II

Equilibrium Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, eutectic systems, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Pb-Sn, Fe-Fe3C, Cu-Ni and Al-Cu.

UNIT -III

Cast Irons and Steels: Extraction of Iron, Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheroidal graphite cast iron, applications of cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Had field manganese steels, Maraging steels, tool and die steels.

UNIT - IV

Heat treatment of Alloys: Effect of alloying elements on Fe-Fe3C system, Annealing, normalizing, hardening, TTT diagrams, tempering, hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

UNIT - VNon-ferrous Metals and Alloys: Structure and properties of Copper and its alloys, Aluminum and its alloys, Titanium and its alloys.

Ceramic Materials:

Crystalline ceramics, glasses, cermets, abrasive materials, nanomaterials–definition, properties and applications.

Composite Materials:

Classification of composites, methods to manufacture the composites, particle reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal matrix composites and C – C composites.

Text Books:

1. Donald R. Askeland and WendelinJ.Wright, Essential of Materials Science and Engineering –Global Engineering Publisher, 4th edition, 2019.
2. Sidney H.Avner, Introduction to Physical Metallurgy- McGraw Hill Publishers, 2ndedition and 2017.

References:

1. Dr. V.D.Kodgire, Material Science and Metallurgy – Everest Publishers, 31st edition and2011.
2. Callister& Balasubramanian, Materials Science and engineering, Wiley Publications, 9thedition and 2015.
3. Traugott Fischer – Material Science for Engineering students –Elsevier Publisher and 2009.
4. V. Rahghavan, PHI Publisher - Material science and Engineering, 6th edition, and2015.
5. Yip-Wah Chung- Introduction to Material Science and Engineering, CRC Press, 1st edition and 2006
6. A V K Suryanarayana - Material Science and Metallurgy, B S Publications 1st edition and2014.
7. U. C. Jindal Material Science and Metallurgy – Pearson Publications, 1st edition and2011.
8. Vijendra Singh - Physical Metallurgy, Standard Publishers, 1st edition, and2005.

B.TECH IV SEMESTER **BSC**

L	T	P	C
3	0	0	3

20ME4T01: COMPLEX VARIABLES AND STATISTICAL METHODS

Pre-requisite: Basic knowledge about Calculus and Probability

Course Objective: Objective of the course is to impart

- basic understanding of complex variable theory
- description of sampling distribution of means, proportions & variances
- testing the hypothesis concerning means, proportions & variances

Course Outcomes:

S. No.	At the end of the course, student will be able to
CO 1:	Determine analytic and non-analytic functions
CO 2:	Analyze the analytic function into a power series which is useful in the study of communication systems.
CO 3:	Understand random variables and probability distributions
CO 4:	Apply different distributions to compute confidence intervals
CO 5:	Test the hypothesis concerning means and proportions

SYLLABUS

UNIT-I: Analytic Functions:

Introduction, Complex function, Limit and continuity of a complex function, Derivative of f(z), Analytic functions, Harmonic functions & orthogonal system, finding analytic functions by Milne-Thomson method. Applications to flow problems.

UNIT-II: Complex Integration and Residues: (all theorems without proofs)

Complex integration, Cauchy's theorem and Cauchy's integral formula, Series of complex terms, Taylor's series and Laurent's series. Zeros and singularities of an analytic function, Residues and Cauchy-Residue theorem. Evaluation of real definite integrals using contour integration about unit circle.

UNIT-III: Random variables and distributions:

Introduction-Discrete & Continuous Random variable - Distribution functions.
Binomial, Poisson distributions. Continuous distribution: Normal distributions, Normal approximation to Binomial distribution.

UNIT-IV: Sampling Theory:

Introduction - Population and samples- Sampling distribution of means (s known)- Central limit theorem- t-distribution- Sampling distribution of means (s unknown)- Sampling distribution of variances - Point estimation- Maximum error of estimate - Interval estimation.

UNIT-V: Tests of Hypothesis:

Introduction –Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors – Level of significance - One tail and two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences.

Text Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rd Edition, 2014.
2. **Richards A Johnson, Irvin Miller and Johnson E Freund**. Probability and Statistics for Engineering, 9th Edition, PHI.

Reference Books:

3. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.
4. **Jay l. Devore,** Probability and Statistics for Engineering and the Sciences, 8thedition, Cengage Publshers.

B.TECH IV SEMESTER **PCC**

L	T	P	C
3	0	0	3

20ME4T04 KINEMATICS OF MACHINERY

UNIT - I

MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained. Grublers criterion, Grashoff's law, Degrees of freedom, Kutzbach criterion for planar mechanisms, Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism– inversion of mechanism – inversions of quadric cycle, chain – single and double slider crank chains.

UNIT - II

LOWER PAIR MECHANISM: Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russel – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph. Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio; Hooke's Joint: Single and double – Universal coupling–application–problems.

UNIT - III

KINEMATICS: Velocity and acceleration – Motion of a link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain. Velocity and acceleration analysis of for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous centre of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT - IV

CAMS: Definitions of cam and followers – their uses – Types of followers and cams – Terminology –Types of follower motion: Uniform velocity, Simple harmonic motion and uniform acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases. Analysis of motion of followers: Roller follower – circular cam with straight, concave and convex flanks.

Power Transmissions: Introduction, Belt and rope drives, selection of belt drive- types of belt drives, V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

UNIT - V

GEARS: Higher pairs, friction wheels and toothed gears–types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

GEAR TRAINS: Introduction to gear Trains, Train value, Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box-Differential gear for an automobile.

Text Books:

1. A.Ghosh & A.K.Malik , Theory of Mechanisms and machines, 4/e, East West Press Pvt. Ltd,2011
2. S.S.Rattan , Theory of Machines, 4/e, Tata Mc-Graw Hill, 2014
3. **J.J** Uicker, G.R.Pennock&J.E.Shigley, Theory of machines and Mechanisms –3/e Oxford publishers,2009.

References:

1. J.E.Shigley, Theory of Machines and Mechanisms, 4/e, Oxford, 2014
2. P.L.Ballaney, Theory of Machines & Mechanisms, 25/e, Khanna Publishers,Delhi, 2003
3. Ashok G. Ambekar, Mechanism and Machine Theory 1/e PHI Publishers,2007.
4. Bevan (Author), The Theory of Machines, 3/e Paperback,2009

5. J.S. Rao, Kinematics of Machinery through Hyper Works, 18 volume, Springer Publ,2001

6. Vickers, Theory of machines and Machinery, 4/e, Oxford 2014

B.TECH IV SEMESTER		**HSMC**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**
20ME4T05	**MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS**					

Course Objectives:

- The Learning objectives of this paper are to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting
- To familiarize about the Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation
- Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals

Course Outcomes:

CO1: The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product

CO2: The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs

CO3: The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units

CO4: The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis

CO5: The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making

SYLLABUS

UNIT I

Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of

Demand, Types of Elasticity of Demand and Measurement Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT II

Theories of Production and Cost Analyses: Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

UNIT III

Introduction to Markets, Theories of the Firm & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles : Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

UNIT IV

Introduction to Accounting & Financing Analysis: Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

UNIT V

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(payback period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Text Books:

1) A R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

Reference Books:

1) Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & Company Ltd.
2) JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition edition
3) N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & Company Ltd.
4) MaheswariS.N,AnIntroduction to Accountancy, Vikas Publishing House Pvt Ltd
5) I.M Pandey, Financial Management , Vikas Publishing House Pvt Ltd
6) V. Maheswari, Managerial Economics, S. Chand & Company Ltd.

B.TECH IV SEMESTER		PCC	L	T	P	C
			0	0	3	1.5

20ME4L06 **PROFICIENCY THROUGH READING AND WRITING LAB**

Unit I Vocabulary Building

1.1 The concept of word formation

1.2. Root words from foreign languages and their use in English

1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives

1.4 Synonyms, antonyms, and standard abbreviations

Unit II Writing Skills

2.1 Organizing principles of paragraphs in documents

2.2 Creative writing

2.3 Essay writing

Unit III Identifying Common Errors in Writing

3.1 Subject-verb agreement

3.2 Noun-pronoun agreement

3.3 Misplaced modifiers

3.4 Articles

3.5 Prepositions

3.6 Redundancies

3.7 Clichés

Unit IV Comprehension

4.1 Scanning

4.2 Skimming

4.3 Identifying the main ideas

Unit V Reading for Pleasure

5.1 Review of an autobiography/biography

5.2 Review of a novel

5.3 Review of a self help book

Suggested Readings:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007.
3. On Writing Well. William Zinsser. Harper Resource Book. 2001.
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.

B.TECH IV SEMESTER	SC	L	T	P	C
		0	0	4	2

20ME4S09 **PROGRAMMING THROUGH MATLAB (Skill Oriented Course)**

The Structure of this Skill Course is divided into three modules under Matlab environment. With these additional skills, The student can get through knowledge in Matlab. By its nature, the presentation on MATLAB and its Toolboxes in this course cover all the background and details necessary for a complete understanding of MATLAB. The limited objective of the presentation here is to give enough information to enable the reader to apply MATLAB to the analysis and design problems covered in this course For further details, the readers are referred to extensive documentation, in both printed and online format, provided by the Math Works Inc

Objectives:

- Introduction to MATLAB family of programs
- Brief introduction to MATLAB base program in an interactive "hands on" tutorial style
- At the end of the day, our most important goal is that you gain useful computational skills that are applicable to your field of study. Advances in computing have revolutionized science and engineering in the past couple decades. hope will enable you to harness this computational power and help you accomplish great things in your career

Module 1

1 Introduction to MATLAB
2 Visualization and Programming
3 Solving Equations, Curve Fitting, and Numerical Techniques
4 Advanced Programming (iterations, Fibonacci series calendars and clocks, Google page rank, Game of life, Sudoku)
5 Various Functions and Toolboxes

Module 2

1 Introduction to Simulink
2 Analysis of Linear and Non linear Systems
3 Plotting of Specific Functional systems with Simulink
4 Basic Functional Units in Communication Systems
5 Control Systems analysis in time and frequency

Module 3

1 Optimum Statistical Parameters
2 Curve Fitting And Regression
3 Basic Neural Networks for computations
4 Vibrations and Dynamics
5 Kinematics Simulators

VII Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

OPERATIONAL RESEARCH(18ME7T02)

UNIT – I

Development – definition– characteristics and phases – types of operation research models –applications.
ALLOCATION: Linear programming problem formulation – graphical solution – simplex method – artificial variables techniques -two–phase method, big-M method – duality principle.

UNIT – II

TRANSPORTATION PROBLEM: Formulation – optimal solution, unbalanced transportation problem – degeneracy, assignment problem – formulation – optimal solution - variants of assignment problem-traveling salesman problem.
SEQUENCING – Introduction – flow –shop sequencing – *n* jobs through two machines – *n* jobs through three machines – job shop sequencing – two jobs through 'm' machines.

UNIT – III

REPLACEMENT: Introduction – replacement of items that deteriorate with time – when money value is not counted and counted – replacement of items that fail completely, group replacement.

UNIT – IV

THEORY OF GAMES: Introduction – mini. max (max. mini) – criterion and optimal strategy – solution of games with saddle points – rectangular games without saddle points – 2 x 2 games – dominance principle – m x 2 & 2 x n games -graphical method.
WAITING LINES: Introduction – single channel – poison arrivals – exponential service times – with infinite population and finite population models– multichannel – poison arrivals – exponential service times with infinite population single channel poison arrivals.
SIMULATION: Definition – types of simulation models – phases of simulation– applications of simulation – inventory and queuing problems – advantages and disadvantages – simulation languages.

UNIT – V

INVENTORY : Introduction – single item – deterministic models – purchase inventory models with one price break and multiple price breaks – shortages are not allowed – stochastic models – demand may be discrete variable or continuous variable – instantaneous production. Instantaneous demand and continuous demand and no set up cost. ABC & VED Analysis.

DYNAMIC PROGRAMMING: Introduction – Bellman's principle of optimality – applications of dynamic programming- capital budgeting problem – shortest path problem – linear programming problem.

TEXT BOOKS:

• Operations Research-An Introduction/Hamdy A Taha/Pearson publishers
• Operations Research –Theory & publications / S.D.Sharma-Kedarnath/McMillan publishers India Ltd

REFERENCES:

- Introduction to O.R/Hiller & Libermann/TMH
- Operations Research /A.M.Natarajan,P.Balasubramani,A. Tamilarasi/Pearson Education.
- Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman/Wiley
- Operations Research / R.Pannerselvam/ PHI Publications.
- Operations Research / Wagner/ PHI Publications.
- Operation Research /J.K.Sharma/MacMilan Publ.
- Operations Research/ Pai/ Oxford Publications
- Operations Research/S Kalavathy / Vikas Publishers
- Operations Research / DS Cheema/University Science Press
- Operations Research / Ravindran, Philips, Solberg / Wiley publishers

VII Semester	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

MINI PROJECT(18ME7P13)

VIII Semester

	L	T	P	C
	3	0	0	3

MECHANICAL VIBRATIONS(18ME8T01)

PROFESSIONAL ELECTIVE -3

UNIT - I

Single Degree Freedom Systems: Un-damped free vibration: Classical method, Energy method, equivalent systems, torsional systems. Damped free vibration- Viscous damping, under damping, critical damping, over damping. Coulomb damping, equivalent damping coefficient. Simple problems.

UNIT - II

Forced vibrations of Single Degree Freedom Systems : Steady state forced vibration, sources of excitation, impressed harmonic force, resonance impressed force due to unbalance, motion excitation, transmissibility and isolation, performance of different type of isolators, power absorbed by viscous damping.

UNIT - III

Two Degree Freedom Systems: Formulation of Equation of motion, Natural frequencies and modes of vibration by classical method, coupled pendulum, forced vibration, dynamic vibration absorber.

UNIT - IV

Multi Degree Freedom Systems: Lagrangian method for formulation of equation of motion Influence co-efficient method, Lumped mass and distributed mass systems, Stodola method, Holzer's method, model analysis of free and forced vibrations.

Whirling of shafts: Critical speed of shafts, Rayleigh's upper bound approximation, Dunkerley's lower bound approximation, critical speed of shafts with damping

UNIT - V

Vibration measurement and Applications: Transducers: variable resistance transducers, Piezoelectric transducers, electrodynamic transducers and linear variable differential transformer transducer; Vibration pickups: vibrometer, accelerometer, velometer and phase distortion; Frequency-measuring instruments; Vibration exciters- Mechanical exciters and electrodynamic shaker.

Text books:

1. Singrasu S. Rao, Mechanical Vibrations, 6/e, Pearson Education, 2018.

2. G.K.Groover, Mechanical Vibrations, 8/e, 2009

Reference books:

1. L. Meirovich, Elements of Vibrations Analysis, Tata McGraw Hill, 1986
2. S. Graham Kelly, Mechanical Vibrations, Tata McGraw Hill, 1996
3. William Thomson, Theory of Vibrations with Applications, 5/e, Pearson, 2008
4. William Weaver, Timeoshenko, and Young, Vibration Problems in Engineering, 5/e, John Wiley, 2013.

VIII Semester

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

NON-DESTRUCTIVE TESTING(18ME8T03)

PROFESSIONAL ELECTIVE -3

UNIT I

Introduction to non-destructive testing: Radiographic test**,** Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography.

UNIT II

Ultrasonic test: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect , Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection - Effectiveness and Limitations of Ultrasonic Testing.

UNIT III

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing**.**

Eddy Current Test: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current-Testing Effectiveness of Eddy Current Testing.

Magnetic Particle Test: Magnetic Materials, Magnetization of Materials, Demagnetization of Materials, Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

UNIT IV

Infrared And Thermal Testing: Introduction and fundamentals to infrared and thermal testing–Heat transfer –Active and passive techniques –Lock in and pulse thermography–Contact and non contact thermal inspection methods–Heat sensitive paints –Heat sensitive papers —thermally quenched phosphors liquid crystals –techniques for applying liquid crystals –other temperature sensitive coatings –Inspection methods –Infrared radiation and infrared detectors–thermo mechanical behavior of materials–IR imaging in aerospace applications, electronic components, Honey comb and sandwich structures–Case studies.

UNIT V

Industrial Applications of NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions

TEXT BOOKS:

1. J Prasad, GCK Nair , Non destructive test and evaluation of Materials, Tata mcgraw-Hill Education Publishers, 2008.
2. Josef Krautkrämer, Herbert Krautkrämer, Ultrasonic testing of materials, 3/e, Springer-Verlag, 1983.
3. X. P. V. Maldague, Non destructive evaluation of materials by infrared thermography, 1/e, Springer-Verlag, 1993.

REFERENCES:

1. Gary L. Workman, Patrick O. Moore, Doron Kishoni, Non-destructive, Hand Book, Ultrasonic Testing, 3/e, Amer Society for Nondestructive, 2007.
2. ASTM Standards, Vol 3.01, Metals and alloys

B.TECH III SEMESTER

	L	T	P	C
BSC	3	0	0	3

20EC3T01 COMPLEX VARIABLES

Pre-requisite: Basic knowledge about Calculus and Differential Equations

Course Objective: Objective of the course is to impart

- basic understanding of complex variable theory
- knowing the theory of line integral together with the theory of power series
- understanding the geometrical nature of analytic functions

Course Outcomes:

S. No.	At the end of the course, student will be able to
CO 1:	Determine analytic and non-analytic functions
CO 2:	Analyze the analytic function into a power series which is useful in the study of communication systems.
CO 3:	Illustrate the techniques of the contour integration to determine the real integrals
CO 4:	Determine the solution of boundary value problems by mapping complex domains into the standard domains
CO 5:	Analyze the solutions of Bessel's and Legendre's equations using power series

SYLLABUS

UNIT-I: Analytic Functions:

Introduction, Complex function, Limit and continuity of a complex function, Derivative of f(z), Analytic functions, Harmonic functions & orthogonal system, finding analytic functions by Milne-Thomson method. Applications to flow problems.

UNIT-II: Complex Integration:

Complex integration, Cauchy's theorem and Cauchy's integral formula (without proofs), Series of complex terms, Taylor's series and Laurent's series (without proofs).

UNIT-III: Residues:

Zeros and singularities of an analytic function, Residues and Cauchy-Residue theorem (without proof). Evaluation of real definite integrals-Integration around the unit circle, Integration around a small semi-circle and indenting the contours having poles on real axis.

UNIT-IV: Conformal Mappings:

Transformation by e^z, lnz, z^2, z^n (n positive integer), sin z, cosz, z + a/z. Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles and cross ratio – determination of bilinear transformation mapping 3 given points.

UNIT-V: Bessel's and Legendre's Equations:

Bessel's equation, Recurrence formulae for $J_n(x)$, Expansions for J_0 and J_1, Value of $J_{1/2}$. Legendre's equation, Rodrigue's formula, Legendre polynomials, Recurrence formulae for $P_n(x)$.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH III SEMESTER **PCC**

L	T	P	C
0	0	3	1.5

20EC3L08 DIGITAL ELECTRONICS LAB

COURSE OBJECTIVES:
The primary objectives of this course are given below:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems
- Verifying and analyzing the practical digital electronic circuits.
- To implement simple logical operations using combinational logic circuits
- Enabling students to take up application specific sequential circuit to specify the finite state machine and designing the logic circuit.

COURSE OUTCOMES:
Upon completion of the course student will be able to:

CO1: Understand working of logic gates and verify Boolean theorems.

CO2: Design, Test and evaluate various combinational circuits such as adders, Decoders, multiplexers, and de-Multiplexers.

CO3: Construct flips-flops, counters and shift registers and verify its functionality

LIST OF EXPERIMENTS

1. Verification of Basic Logic Gates.
2. Implementing all individual gates with universal gates NAND & NOR.
3. Design a circuit for the given canonical form, draw the circuit diagram and verify the De-Morgan laws.
4. Construct Half Adder and Full Adder and verify the truth table.
5. Construct Full Adder using 2 Half Adders and verify the truth table.
6. Design a combinational logic circuit for 4 * 1 MUX and verify the truth table.
7. Design a combinational logic circuit for 1 * 4 De -MUX and verify the truth table.
8. Design a combinational logic circuit for BCD - 7 Segment Decoder
9. Verification of truth tables of the basic Flip -Flops
10. Implementation of Master Slave Flip-Flop with J-K Flip- Flop and verify the truth table for Race Around condition.
11. Design the Mod 6 counter and verify the truth table.

12. Design a Decade Counter and verify the truth table.
13. Design a Up Down Counter and verify the truth table.
14. Construct 4-Bit Ring counter and verify the truth table.
15. Design a 8- Bit Shift Register and verify the truth table.

Equipment Required:

1. Hardware kits using Various digital IC's

TEXT BOOKS:

1. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
2. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.

B.TECH III SEMESTER **SC**

L	T	P	C
0	0	4	2

20EC3S09 DATA STRUCTURES THROUGH C
(Skill Oriented Course)

Course Objectives:

- Understand different Data Structures
- Apply Data Structures to real world problems using C.

Course Outcomes:

CO1: Use basic data structures such as arrays and linked list.

CO2: Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.

CO3: Use various searching and sorting algorithms.

CO4: Understand and use Trees for complex operations

Topics Covered: Searching, Sorting, Linked Lists, Stacks, Queues, Trees-Operations, Binary Search Trees- Operations

LIST OF EXPERIMENTS:

Exercise -1 (Searching)

a) Write C program that use both recursive and non-recursive functions to perform Linear search for a Key value in a given list.

b) Write C program that use both recursive and non-recursive functions to perform Binary search for a Key value in a given list.

Exercise -2 (Sorting-I)

a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order.

b) Write C program that implement Quick sort, to sort a given list of integers in ascending order.

c) Write C program that implement Insertion sort, to sort a given list of integers in ascending order.

Exercise -3 (Sorting-II)

a) Write C program that implement radix sort, to sort a given list of integers in ascending order

b) Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise -4 (Singly Linked List)

a) Write a C program that uses functions to create a singly linked list

b) Write a C program that uses functions to perform insertion operation on a singly linked list

c) Write a C program that uses functions to perform deletion operation on a singly linked list

d) Write a C program to reverse elements of a single linked List.

Exercise -5 (Queue)

a) Write C program that implement Queue (its operations) using arrays.

b) Write C program that implement Queue (its operations) using linked lists

Exercise -6 (Stack)

a) Write C program that implement stack (its operations) using arrays

b) Write C program that implement stack (its operations) using Linked list

c) Write C program for implementing infix to postfix conversion

d) Write a C program that uses Stack operations to evaluate postfix expression

Exercise -7 (Binary Tree)

Write a recursive C program for traversing a binary tree in preorder, in-order and post-order.

Exercise -8 (Binary Search Tree)

a) Write a C program to create a BST

b) Write a C program to insert a node into a BST.

c) Write a C program to delete a node from a BST.

Text Books:

1. Data Structures Using C. 2ndEdition. Reema Thareja, Oxford.

2. Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

Reference Books:

1. Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.

2. Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.

3. Data Structures with C, Seymour Lipschutz TMH

B.TECH IV SEMESTER	**BSC**		**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

20EC4T01 NUMERICAL METHODS & VECTOR CALCULUS

Pre-requisite: Linear Algebra and Differential Equations & Transformation Techniques

Course Objective: Objective of the course is to impart

- understand the basic numerical methods to solve simultaneous linear equations
- knowledge of numerical methods to solve ordinary differential equations
- the types of integration over the lines, surfaces & volumes

Course Outcomes:

S. No.	At the end of the course, student will be able to
CO1:	Determine the solution of transcendental equations by different numerical methods
CO2:	Provide the interpolation techniques which analyze the data of an unknown function
CO3:	Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries
CO4:	Evaluate areas and volumes using double & triple integrals
CO5:	Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.

SYLLABUS

UNIT-I: Numerical Solution of Equations:

Solution of Algebraic and transcendental equations: Bisection method, Method of false position and Newton-Raphson method. Iterative methods of solution of linear simultaneous equations: Jacobi's and Gauss-Seidel iteration methods.

UNIT-II: Interpolation:

Forward and backward, relation between these operators, Differences of a polynomial, Interpolation with unequal intervals: Lagrange's interpolation formula, Newton's forward & backward interpolation formulae & problems.

UNIT-III: Numerical Integration & Numerical Solutions of ordinary differential equations with initial conditions:

Numerical Integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th rules.

Numerical Solution of ODE: Picard's method, Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta method of 4^{th} order.

UNIT-IV: Multiple Integrals:

Double integrals in Cartesian & polar coordinates, Change of order of integration, Triple integrals, Change of variables (Cartesian to Polar, Rectangular coordinates to Cylindrical & Rectangular coordinates to Spherical polar coordinate systems). **Applications:** Area enclosed by plane curves, Volume of solids.

UNIT-V: Vector Differentiation & Vector Integration:

Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, directional derivatives, Del applied to vector point functions-Div& Curl, physical interpretation of div & curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

Line integral, Green's theorem in the plane (without proof), Surface integrals, Stoke's theorem (without proof), Volume integral, Gauss Divergence theorem (without proof).

Text Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43^{rd} Edition, 2014.
2. **B. V. RAMANA,** Higher Engineering Mathematics, Tata MC Graw Hill, 1^{st} Edition, 2007.

Reference Books:

1. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, John Wiley & Sons, 10^{th} Edition, 2015.
2. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi Publications, 9^{th} Edition, 2014.

B.TECH IV SEMESTER **PCC**

L	T	P	C
3	0	0	3

20EC4T06 ANALOG AND DIGITAL COMMUNICATIONS

Course Objectives: Students undergoing this course, are expected to

1. Familiarize with the fundamentals of analog communication systems
2. Familiarize with various techniques for analog modulation and demodulation of signals
3. Distinguish the figure of merits of various analog modulation methods
4. Familiarize with the fundamentals of digital communication systems
5. Familiarize with various techniques for digital modulation and demodulation of signals

Course Outcomes: After undergoing the course, students will be able to

CO1: Differentiate various Analog modulation schemes

CO2: Analyze demodulation schemes and their spectral characteristics

CO3: Analyze noise characteristics of various analog modulation methods

CO4: Differentiate various Digital modulation schemes

CO5: Analyze demodulation schemes and their spectral characteristics

UNIT I: AMPLITUDE MODULATION

Introduction to communication system, need for modulation, , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Detection of AM Waves;, Envelope detector, SNR Calculations of AM waves.

UNIT II: DSB & SSB MODULATION

DSB SC (Double side band suppressed carrier) modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Coherent detection of DSB-SC Modulated waves, SNR Calculations of DSB SC.

SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves. SNR of SSB.

UNIT III: ANGLE MODULATION

Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, zero crossing detector, Phase locked loop, SNR Calculations.

UNIT IV: PULSE DIGITAL MODULATION

Elements of digital communication systems, advantages of digital communication systems, Elements of PCM, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT V: DIGITAL MODULATION TECHNIQUES

Introduction, ASK, FSK, PSK, DPSK, QPSK Transmitter and receivers Probability of error calculations.

TEXT BOOKS:

1. Principles of Communication Systems – H Taub& D. Schilling, Gautam Sahe, TMH, 2007 3rd Edition.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.

REFERENCES:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed.,.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.

B.TECH IV SEMESTER **SC**

L	T	P	C
0	0	4	2

20EC4S09: **PYTHON PROGRAMMING (Skill Oriented Course)**

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1: Structure simple Python programs for solving problems.
CO2: Decompose a Python program into functions.
CO3: Represent compound data using Python lists, tuples, and dictionaries.
CO4: Read and write data from/to files in Python Programs.
CO5: To build software for real needs.

Concepts to be covered:

- Introduction: Variables, Assignment, Keywords, Comments, Input-Output, Indentation
- Types, Operators and Expressions: Data types, Operators, Control flow statements
- Data Structures: Lists, Tuples, Sets, Dictionary, Sequences, Comprehensions
- Functions: Types of Arguments, Anonymous, Fruitful and Lambda Functions.
- Python Packages: Installation and Importing packages, Brief tour of packages like System, math, random, date and time, Numpy, Matplotlib, Multi-threading, scikit-learn and Internet Access.
- Object Oriented Programming Concepts in Python.
- Exception handling in python

Lab Exercises:

1. Write a program to perform various list of operations(eg: Arithmetic, logical, bitwise etc) in python.

2. Write a program to implement control flow statements. 3. Write a programs implementing various predefined function of Lists, Sets, Tuples and Dictionaries.

4. Write a program covering various arguments for a function.

5. Write a program to implement various types of functions.

6. Write a program to implement recursion.

7. Write a program to implement command line arguments.

8. Write a program to create a class and its constructors.

9. Write a program to implement inheritance.

10. Write a program for exception handling.

11. Write a program to perform various linear algebra operations like finding eigen vales and vectors, determinant for a matrix.

12. Write a program to read a file.

13. Write a program to use System,math etc packages.

14. Write a program for visualizing the data using matplotlib package.

15. Write a program to access data from the web and validate it.

16. Write a program to demonstrate multi- threading.

TEXT BOOKS

1. Learning Python, Mark Lutz, Orielly

2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

3. John V Guttag, ―Introduction to Computation and Programming Using Python, Revised and expanded Edition, MIT Press , 2013.

Reference Books:

1. Think Python, Allen Downey, Green Tea Press

2. Core Python Programming, W.Chun, Pearson.

3. Introduction to Python, Kenneth A. Lambert, Cengage

4. “Python in easy steps In Easy Steps”, Mike MC Grath, illustrated edition, In easy steps 2013 publishers.

B. Tech VII Semester

L	T	P	C
3	0	0	3

18EC7T02-Micro Wave Engineering

Course Overview:
To adopt microwave technology in diverse applications as radio astronomy, long distance communication, space navigation, radar systems, medical equipment and missile electronic systems. Because microwave communication system handles a large fraction of the world's international and other long-haul telephone, data and television transmissions. To use microwave technology in wireless communication system such as Direct Broadcast Satellites (DBS) television, personal communication system (PCS), Wireless Local Area Networks (WLAN's), Cellular Video (CV) Systems, and global positioning Satellite (GPS) Systems operate in the frequency of range (1.5 GHZ to 94 GHZ). Thus really heavily on microwave technology.
Prerequisite(s): Electromagnetic waves and Transmission Lines, Antenna and wave Propagation.
Course Objectives:
The Student Will
1. Understand Fundamental Electrical Characteristics of Waveguides and Transmission Lines Through Electromagnetic Field Analysis.
2. Understand The Basic Properties of Polarization and Ferrite Materials Composition in The Case of Waveguide Components.
3. Understand The Multiport Junction Concept for Splitting the Microwave Energy in A Desired Direction.
4. Understand The Function, Design, And Integration of the Major Microwave Components Like Oscillator, Modulator, Power Amplifier, Filter
5. Familiarize Mixer in Building a Microwave Test Bench Setup for Measurements.

Course Outcomes:
After Going Through This Course the Student Will
1. Gain Knowledge of Transmission Lines and Waveguide Structures and How They Are Used as Elements in Impedance Matching and Filter Circuits.
2. Apply Analysis Methods to Determine Circuit Properties of Passive or Active Microwave Devices.
3. Gain Knowledge and Understanding of Microwave Analysis Methods.
4. Distinguish Between M-Type and O-Type Tubes
5. Analyze and Measure Various Microwave Parameters Using a Microwave Test Bench

SYLLABU
S UNIT I
RECTANGULAR & CIRCULAR WAVEGUIDES:
Introduction to microwave communication and EM spectrum, Rectangular wave guide: Field Components, TE, TM Modes, Dominant TE10 mode, Field Distribution, Power, Attenuation. Circular waveguides: TE, TM modes. Wave velocities, Micro strip transmission line (TL), Coupled TL, Strip TL, Coupled strip line, Coplanar TL, Microwave cavities

UNIT II
PASSIVE MICROWAVE DEVICES:
Scattering matrix, Passive microwave devices: Microwave hybrid circuits, Terminations, Attenuators, Phase Shifters, Directional couplers: Two-hole directional couplers, S- Matrix of a directional coupler, Hybrid couplers, Microwave propagation in ferrites, Faraday rotation, Isolators, Circulators. S-parameter analysis of all components.
UNIT III MICROWAVE TUBES:
Microwave tubes: Limitations of conventional active devices at microwave frequency, two cavity Klystron, Reflex Klystron, Magnetron, Traveling wave tube, Backward wave oscillators,

UNIT IV

SOLID STATE AMPLIFIERS AND OSCILLATORS:

Transferred electron devices: Gunn-effect diodes & modes of operation. Avalanche transit – time devices: IMPATT diode, TRAPPAT diode, BARITT diode.

UNIT V

MICROWAVE MEASUREMENTS:

Microwave power measurement, Insertion loss and attenuation measurement, VSWR measurement, Frequency measurement, measurement of cavity Q, Dielectric constant measurement of a solid.

TEXT BOOKS:

1. Samuel Y. Liao, ―Microwave Devices and Circuits‖, 3rd Edition, Pearson Education, 2011 Reprint.
2. Collin.R.E, ―Foundations For Microwave Engineering‖, 2nd Edition, Tata Mcgraw Hill, 2006.

REFERENCES:

1. Microwave and Radar Engineering – G Sasibhushana Rao Pearson
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.

B. Tech VII Semester

L	T	P	C
3	0	0	3

18EC7T09-Computer Architecture & Organization
(OPEN ELECTIVE-III)

OBJECTIVES:

1. Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.
2. In addition to this the memory management system of computer.

Course outcomes: After Going Through This Course the Student Will

1. To know the Basic Structure of computers
2. To know the Register Transfer Language And Micro operations
3. To understand the memory concepts
4. To know the memory systems
5. To understand the concept of input output organization

UNIT-I

BASIC STRUCTURE OF COMPUTERS: The history of Computer development, Computer Types, Functional units, Basic operational concepts, Bus structures, System Software, Performance,Data types, Complements, Data Representation. Fixed Point Representation. Decimal Arithmetic operations Floating – Point Representation.

UNIT-II

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language. Register Transfer, Bus and memory transfer, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions – Instruction cycle. Memory
– Reference Instructions. Input – Output and Interrupt.

UNIT-III

CENTRAL PROCESSING UNIT: Stack Organization. Instruction formats. Addressing modes. Data Transfer and manipulation. Program control.

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example, Design of control unit-Hard wired control. Micro programmed control

UNIT-IV

THE MEMORY SYSTEM: Memory Hierarchy, Main Memory- RAM, ROM, PROM, EPROM, EEPROM , Flash Memory, Associative memory, Cache Memories: Mapping Functions, Virtual memory, Auxiliary memory, Secondary Storage: Magnetic Hard Discs, Optical Disks, Memory management hardware.

UNIT -V

INPUT-OUTPUT ORGANIZATION : Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB).

TEXT BOOKS:

1. Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, 2006.
2. Computer Architecture and Organization – John P. Hayes, Mc Graw Hill International editions, 1998.

REFERENCES:

1. Computer Organization and Architecture – William Stallings 7th Edition, PHI/Pearson, 2006.
2. Computer Organization – Car Hamacher, ZvonksVranesic, SafwatZaky, 5th Edition, McGraw Hill, 2002

B. Tech VII Semester

L	T	P	C
3	0	0	3

18EC7T10-BIO MEDICAL ENGINEERING
(OPEN ELECTIVE-III)

COURSE OBJECTIVES
1. To introduce student to basic biomedical engineeringtechnology
2. To understand the anatomy & physiology of major systems of the body in designing equipment for medicaltreatments.
3. To impart knowledge about the principle and working of different types of bio-medical electronic equipment/devices.

COURSE- OUTCOMES: After Going Through This Course the Student Will
1. To understand diagnosis and therapy relatedequipments.
2. To understand the problem and identify the necessity of equipment for diagnosis and therapy.
3. To understand the importance of electronics engineering in medicalfield.
4. To understand the importance of telemetry in patientcare
5. To know the Diagnostic Techniques

UNIT-1:
INTRODUCTION TO BIOMEDICAL INSTRUMENTATION:Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Envoked Responses.

UNIT-II:
ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, Examples of Electrodes, Basic Transducer Principles, Biochemical Transducers, The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

UNIT-III:
CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sound, Plethysmography.
MEASUREMENTS IN THE RESPIRATORY SYSTEM: The Physiology of The Respiratory System, Tests and Instrumentation for The Mechanics of Breathing, Respiratory Therapy Equipment.

UNIT-IV:
PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.
THERAPEUTIC AND PROSTHETIC DEVICES: Audiometers and Hearing Aids, Laparoscope, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention,

UNIT-V:
DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring.

Text Books:

1. Bio-Medical Electronics and Instrumentation‖, Onkar N. Pandey, Rakesh Kumar, Katson Books.
2. Bio-Medical Instrumentation‖, Cromwell , Wiebell, Pfeiffer

References

1. Introduction to Bio-Medical Equipment Technology‖, 4th Edition, Joseph J. Carr, John M. Brown, Pearson Publications.
2. Hand Book of Bio-Medical Instrumentation‖, Instrumentation‖, Kandahar. McGraw-Hill

B. Tech VII Semester

L	T	P	C
3	0	0	3

18EC7T11-NANO ELECTRONICS
(OPEN ELECTIVE-III)

COURSE OBJECTIVE: This course is intended to cover basics of electronics, transistor, band structure models, nanocapacitors, coulomb blockade, single electron transistor and nanophotonics.

COURSE OUTCOME of the study: After Going Through This Course the Student Will
1. To know nanoelectronics holds the capacity for mass production of high-quality nanodevices with an enormous variety of applications from computers to biosensors, from cell phone to space shuttles and from large display screens to small electronic toys.
2. To know the scaling of transistors and other devices to smaller and smaller sizes, which has provided the basis for this exponential growth, has limits, physical (size of the atoms), technological (lithography) and economic, which will be reached by nanoelectronics in the next coming decade.
3. To understand the materials of nanoelectronics
4. To know Ballistic and Diffusive Transport
5. To understand the concept of quantum dots

UNIT-I

Basics of nano linear optics and electronics**.**Free Electron Theory & The New Ohm‘s Law: Why Electrons flow, Classical free electron theory, Sommerfeld's theory, The quantum of conductance, Coulomb blockade, Towards Ohm‘s law. The Elastic Resistor: Conductance of an Elastic Resistor, Elastic Resistor- Heat dissipation.

Unit-II:

Materials for nanoelectronics: Semiconductors, Crystal lattices: bonding in crystals, Electron energy bands, Semiconductor heterostructures , Lattice-matched and pseudomorphicheterostructures Inorganic nanowires, Organic semiconductors , Carbon nanomaterials: nanotubes and fullerenes

UNIT-III:

Ballistic and Diffusive Transport: Ballistic and Diffusive Transfer Times, Channels for Conduction Conductivity, Conductivity: E(p) or E(k) Relations, Counting States, Drude Formula, Quantized Conductance, Electron Density - Conductivity

Unit-IV:

Electron transport in semiconductors and nanostructures Time and length scales of the electrons in solids, Statistics of the electrons in solids and nanostructures, Fermi statistics for electrons, the density of states of electrons in nanostructures, Electron transport in nanostructures.

Unit - V:

Electrons in traditional low-dimensional structures Electrons in quantum wells: Single modulation-doped heterojunctions, Numerical analysis of a single heterojunction, Control of charge transfer, Electrons in quantum wires, Electron transport in quantum wires, Electrons in quantum dots .

TEXT BOOK:

1. Introduction to Nano Science and Technology by S.M. Lindsay.
2. Supriyo Dutta -Lessons from Nanoscience: A Lecture Note Series, World Scientific (2012).

REFERENCE

1. Michael Wilson, KamaliKannangara, Geoff Smith, Michelle Simmons and Burkhard
2. Raguse, Nanotechnology: Basic Science and Emerging Technologies, Chapman & Hall / CRC, 2002

B. Tech VII Semester

	L	T	P	C
	0	0	2	2

18EC7P13-INDUSTRIAL INTERNSHIP

The students are required take internship at reputed industries to design and develop prototype model relevant to the Electronics and Communication. The internship should be done by individual student. The internship should done either at industry or in institute in connection with industry; student should give presentation and demonstration of internship. The students are required to submit document of internship report at the end.

COURSE OUTCOMES:

After going through this the student will be able to

- Understand the real world problems
- Aquitaine with industry interaction skills
- Gain knowledge to solve and address the problem
- Improve presentation skills and writing skills
- Involve in industrial needs related work

The evaluation is done based on

1. Industry Interaction by student
2. Complexity of problems understand at industry
3. Activities taken place at Industry
4. Any Design and Development in work
5. Presentation and Communication skill of student
6. Report given by the Student

B. Tech VIII Semester

L	T	P	C
3	0	0	3

18EC8T01-CODING THEORY and TECHNIQUES

COURSE OBJECTIVES:

1. Introduce The Principles and Applications of Information Theory.
2. To Teach Study How Information Is Measured in Terms of Probability and Entropy, And The Relationships Among Conditional and Joint Entropies.
3. To Teach Coding Schemes, Including Error Correcting Codes.
4. Explain How This Quantitative Measure of Information May Be Used in Order to Build Efficient Solutions to Multitudinous Engineering Problems.

COURSE OUTCOMES:

After completion of the course, the student is able to

CO1: Design the channel performance using Information theory.
CO2: Comprehend various error control code properties
CO3: Apply linear block codes for error detection and correction
CO4: Apply convolution codes for performance analysis & cyclic codes for error detection and correction.
CO5: Design BCH & RS codes for Channel performance improvement against burst errors.

Unit-I

Information Theory: Introduction, Measure of information, Information content of message, Average Information content of symbols in Long Independent sequences, Average Information content of symbols in Long dependent sequences, Statistical Model of Information Sources, Entropy and Information rate

Unit-II

Source Coding: Source coding theorem, Prefix Codes, Kraft McMillan Inequality Property Encoding of the Source Output, Shannon‘s Encoding Algorithm. Shannon Fano Encoding Algorithm, Huffman codes, Extended Huffman coding, Arithmetic Coding,

UNIT-III

Information Channels: Communication Channels, Channel Models, Channel Matrix, Joint probability Matrix, Binary Symmetric Channel, System Entropies, Mutual Information, Channel Capacity, Channel Capacity of: Binary Symmetric Channel.

UNIT-IV

Error Control Coding: Introduction, Examples of Error control coding, methods of Controlling Errors, Types of Errors, types of Codes, Linear Block Codes: matrix description of Linear Block Codes, Error Detection and Error Correction Capabilities of Linear Block Codes, Single Error Correcting Hamming Codes, Table lookup Decoding using Standard Array. Binary Cyclic Codes: Algebraic Structure of Cyclic Codes, Encoding using an (n-k) Bit Shift register, Syndrome Calculation, Error Detection and Correction

UNIT-V

Some Important Cyclic Codes: Golay Codes, BCH Codes Convolution Codes: Convolution Encoder, Time domain approach, Transform domain approach, Code Tree, Trellis and State Diagram, The Viterbi Algorithm)

Text, References &

Software Textbook:

1. Information Theory, Inference and Learning Algorithms by David J.C. MacKay. Draft 2.2.4 August 31, 2001.
2. Man Young Rhee, "Error Correcting Coding Theory", 1989, McGraw-Hill Man Young Rhee, "Error Correcting Coding Theory", 1989, McGraw-Hill

Reference book:

1. Elements of Information Theory, by Thomas M. Cover and Joy A. Thomas, John Wiley, 1991, ISBN 0-471- 06259-6
2. Todd K.Moon, "Error Correction Coding – Mathematical Methods and Algorithms", 2006, Wiley India

Software:

MATLAB or Mathcad and access to a C++ compiler **Internet Resources:**

http://www.inference.phy.cam.ac.uk/mackay/itprnn/

http://www.math.psu.edu/gunesch/entropy.htm

B. Tech VIII Semester

L	T	P	C
3	0	0	3

18EC8T02-SPREAD SPECTRUM COMMUNICATIONS

(Professional Elective – IV)

Course Objectives:

The objectives of this course are to make the student

1. Understand the concept of Spread Spectrum and study various types of Spread spectrum sequences and their generation.
2. Understand the principles of Code Division Multiple Access (CDMA) and use of Spread spectrum concept in CDMA
3. Understand various Code tracing loops for optimum tracking of wideband signals viz spread spectrum signals.
4. Understand the procedure for synchronization of receiver for receiving the Spread spectrum signal.

Course Outcomes:

On completion of this course student will be able to

1. Generate various types of Spread spectrum sequences and can simulate CDMA system (Both Transmitter & Receiver).
2. Analyze the performance of Spread spectrum systems in Jamming environment and systems with Forward Error Correction.
3. Can provide detection and cancellation schemes for Multiuser in CDMA cellular radio.
4. Understand various Code tracing loops for optimum tracking of wideband signals viz spread spectrum signals.
5. Understand the procedure for synchronization of receiver for receiving the Spread spectrum signal

UNIT - I

Introduction to Spread Spectrum Systems: Fundamental Concepts of Spread Spectrum Systems, Pseudo Noise Sequences, Direct Sequence Spread Spectrum, Frequency Hop Spread Spectrum, Hybrid Direct Sequence Frequency Hop Spread Spectrum, Code Division Multiple Access. Binary Shift Register Sequences for Spread Spectrum Systems: Introduction, Definitions, Mathematical Background and Sequence Generator Fundamentals, Maximal Length Sequences, Gold Codes.

UNIT - II

Code Tracking Loops: Introduction, Optimum Tracking of Wideband Signals, Base Band Delay-Lock Tracking Loop, Tau-Dither Non- Coherent Tracking Loop, Double Dither NonCoherent Tracking Loop.

UNIT - III

Initial Synchronization of the Receiver Spreading Code: Introduction, Problem Definition and the Optimum Synchronizer, Serial Search Synchronization Techniques, Synchronization using a Matched Filter, Synchronization by Estimated the Received Spreading Code.

UNIT - IV

Cellular Code Division Multiple Access (CDMA) Principles: Introduction, Wide Band Mobile Channel, The Cellular CDMA System, Single User Receiver in a Multi User Channel, CDMA System Capacity. Multi-User Detection in CDMA Cellular Radio: Optimal Multi-User Detection, Linear Suboptimal Detectors, Interference Combat Detection Schemes, Interference Cancellation Techniques.

UNIT - V

Performance of Spread Spectrum Systems in Jamming Environments: Spread Spectrum Communication System Model, Performance of Spread Spectrum Systems without Coding. Performance of Spread Spectrum Systems with Forward Error Correction: Elementary Block Coding Concepts, Optimum Decoding Rule, Calculation of Error Probability, Elementary Convolution Coding Concepts, Viterbi Algorithm, Decoding and Bit-Error Rate.

TEXT BOOKS:

1. Rodger E Ziemer, Roger L. Peterson and David E Borth - –Introduction to Spread Spectrum Communication- Pearson, 1st Edition, 1995.
2. Mosa Ali Abu-Rgheff – ―Introduction to CDMA Wireless Communications.‖ Elsevier Publications, 2008.

REFERENCE BOOKS:

1. George R. Cooper, Clare D. Mc Gillem - ―Modern Communication and Spread Spectrum,‖ McGraw Hill, 1986.
2. Andrew j. Viterbi - ―CDMA: Principles of spread spectrum communication,‖ Pearson Education, 1st Edition, 1995

B. Tech VIII Semester

L	T	P	C
3	0	0	3

18EC8T03-STATISTICAL SIGNAL PROCESSING
(Professional Elective – IV)

COURSE OBJECTIVES

1. Introduce graduate students to the mathematical ideas that form the basis for modern statistically-based analysis of signals and systems.
2. To study the mathematical background of signal detection and estimation.
3. To study and use classical and Bayesian approaches to formulate problems.
4. To study signal detection and parameter estimation from noisy signals.
5. To study filtering methods for parameter estimation.

COURSE OUTCOMES:

1. Generalize the properties of statistical models in the analysis of signals using Stochastic processes.
2. Differentiate the prominence of various spectral estimation techniques for Achieving higher resolution in the estimation of power spectral density.
3. Outline various parametric estimation methods to accomplish the signal modeling even at higher order statistics.
4. Design and development of optimum filters using classical and adaptive algorithms.
5. Extrapolate the importance of least squares techniques and decomposition methods in analyzing the signal estimations.

Unit-1:

Review of random variables: Distribution and density functions, moments, independent, uncorrelated and orthogonal random variables; Vector-space representation of Random variables, Schwarz Inequality Orthogonality principle in estimation, Central Limit theorem, Random processes, wide-sense stationary processes, autocorrelation and auto covariance functions, Spectral representation of random signals, Wiener Khinchin theorem Properties of power spectral density, Gaussian Process and White noise process. Random signal modeling: MA(q), AR(p) , ARMA(p, q) models.

Unit-II

Parameter Estimation: Theory Principle of estimation and applications, Properties of estimates, unbiased and consistent estimators, Minimum Variance Unbiased Estimates (MVUE), Cramer Rao bound, Efficient estimators; Criteria of estimation: the methods of maximum likelihood and its properties; Bayesian estimation: Mean square error and MMSE, Mean Absolute error, Hit and Miss cost function and MAP estimation.

Unit-III

Estimation of signal in presence of white Gaussian Noise: Linear Minimum Mean-Square Error (LMMSE) Filtering: Wiener Hoff Equation, FIR Wiener filter, Causal IIR Wiener filter, Noncausal IIR Wiener filter, Linear Prediction of Signals, Forward and Backward Predictions, Levinson Durbin Algorithm, Lattice filter realization of prediction error filters.

Unit-IV

Adaptive Filtering: Principle and Application, Steepest Descent Algorithm Convergence characteristics; LMS algorithm, convergence, excess mean square error, Leaky LMS algorithm; Application of Adaptive filters; RLS algorithm, derivation, Matrix inversion Lemma, Initialization, tracking of nonstationary.

Unit-V

Kalman filtering: State-space model and the optimal state estimation problem, discrete Kalman filter, continuous- time Kalman filter, extended Kalman filter.

TEXT BOOKS

1.Discrete Random Signals and Statistical Signal Processing, By Charles W. Therrien, Prentice Hall Signal Processing Series

REFERENCE TEXT BOOK

1.M. H. Hayes, Statistical Digital Signal Processing and Modeling, John Wiley & Sons, Inc.,

2.D.G. Manolakis, V.K. Ingle and S.M. Kogon: Statistical and Adaptive Signal Processing, McGraw Hill, 2000. 3.

SIMULATION TEXT BOOKS

1.Statistical Digital Signal Processing and Modeling by Monson Hayes, John Wiley & Sons, Inc.,

2.J. G. Proakis et. al., Algorithms for Statistical Signal Processing, Pearson Education, 2002.

B. Tech VIII Semester

L	T	P	C
3	0	0	3

18EC8T05-Operating Systems

OPEN ELECTIVE IV

COURSE OBJECTIVES

1. To learn the fundamentals of Operating Systems.
2. To learn the mechanisms of OS to handle processes and threads and their communication
3. To learn the mechanisms involved in memory management in contemporary OS
4. To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
5. To know the components and management aspects of concurrency management

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

1. Understand the functionalities of an operating system and Evaluate different CPU scheduling algorithms.
2. Apply synchronization to cooperating processes and handle the deadlocks
3. Learn various management techniques for efficient utilization of system memory.
4. Understand and analyze theory and implementation of files and Evaluate different disk scheduling algorithms.
5. Analyze the functionalities in various operating systems.

UNIT I

Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

Process Management – Process concept, the process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Inter process Communication, Scheduling- Basic Concepts, Scheduling Criteria, and Scheduling Algorithms.

UNIT-II:

Concurrency: Process Synchronization, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples

UNIT-III:

Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

UNIT-IV:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation

Virtual Memory Management:

Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT V:

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management **Mass-storage structure** overview of Mass-storage structure, Disk scheduling, Device drivers **TEXT BOOKS:**

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.

2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.

REFERENCES:

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.

2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education‖, 1996.

B. Tech VIII Semester	L	T	P	C
	3	0	0	3

18EC8T06-SOFT COMPUTING TECHNIQUES

OPEN ELECTIVE IV

COURSE OBJECTIVES:

1. Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
2. Introduce students to artificial neural networks and fuzzy theory from an engineering perspective.
3. Understand Soft Computing concepts, technologies, and applications.
4. Understand the underlying principle of soft computing with its usage in various application.
5. Understand different soft computing tools to solve real life problems.

COURSE OUTCOMES:

Upon completion of the course, the student is expected to

1. Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
2. Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
3. To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
4. Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
5. Reveal different applications of these models to solve engineering and other problems.

UNIT –I

Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, and Knowledge representation - Expert systems.

UNIT –II

Artificial Neural Networks: Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network.

UNIT-III

Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT –IV

Fuzzy Logic System: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inferencing and defuzzification, Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT –V

Genetic Algorithm: Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search techniques for solving optimization problems, Applications.

TEXT BOOKS:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCE BOOKS:

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. & Folger T.A., Prentice-Hall of India Pvt. Ltd.,
2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994..

B. Tech VIII Semester

L	T	P	C
3	0	0	3

18EC8T07- MECHATRONICS
OPEN ELECTIVE IV

COURSE OBJECTIVE The main objective of this course is to introduce the integrative nature of Mechatronics. To describe the basic programming, different components and devices of mechatronics systems.

COURSE OUTCOME:

Upon completion of this course, the students can able

1. Basic concepts of mechatronics
2. To design mechatronics system with the help of Microprocessor
3. To design PLC and other electrical and Electronics Circuits
4. To understand the concept of solid state Devices
5. To know Dynamic models & controllers

UNIT I

Introduction to Mechatronics – Systems – Concepts of Mechatronics approach – Need for Mechatronics – Emerging areas of Mechatronics – Classification of Mechatronics. Sensors and Transducers: Static and dynamic Characteristics of Sensor, Potentiometers – LVDT – Capacitance sensors – Strain gauges – Eddy current sensor – Hall effect sensor – Temperature sensors – Light sensors.

UNIT II

Introduction – Architecture of 8085 – Pin Configuration – Addressing Modes –Instruction set, Timing diagram of 8085 – Concepts of 8051 microcontrollers – Block diagram

UNIT III

Introduction – Basic structure – Input and output processing – Programming – Mnemonics – Timers, counters and internal relays – Data handling – Selection of PLC, Basic programming in PLC.

UNIT IV

Solid state electronic devices - PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering.

UNIT V

Dynamic models and analogies, System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trend.

TEXT BOOKS:

1. Bolton, –Mechatronics‖, Printice Hall, 2000

2. Ramesh S Gaonkar, –Microprocessor Architecture, Programming, and Applications with the 8085‖, 5th Edition, Prentice Hall, 2008.

REFERENCE BOOKS:

1. Mechatronics System Design / Devdas shetty/Richard/Thomson.

2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

B. Tech VIII Semester

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2	0	0	2

COURSE OBJECTIVES:

18EC8T08-DATA COMMUNICATION& NETWORKING
OPEN ELECTIVE-V

The objectives of this course are

1. To Focus on information sharing and networks.
2. To Introduce flow of data, categories of network, different topologies.
3. To Focus on different coding schemes.
4. Brief the students regarding protocols and standards.
5. To give clear idea of signals, transmission media, errors in data communications and their correction, networks classes and devices, etc.

COURSE OUTCOMES:

1. On successful completion of the course, the student will be having the basic knowledge of data sharing, transmission media and their protocols.
2. Student will have the basic knowledge of computer networks.
3. To Focus on information sharing and networks.
4. To Introduce flow of data, categories of network, different topologies.
5. To Focus on different coding schemes

UNIT-1

Introduction to data communication and networking: Why study data communication? Data Communication, Networks, Protocols and Standards, Standards Organizations. Line Configuration, Topology, Transmission Modes, Categories of Networks Internet works.

Study of OSI and TCP/IP protocol suit: The Model,Functions of the layers,TCP/IP Protocol Suites

UNIT-2

Study of Signals: Analog and Digital, Periodic and Aperiodic Signals, Analog Signals, Time and Frequency Domains, Composite Signals, Digital Signals.

Study of Digital transmission: Digital to Digital Conversion, Analog to Digital Conversion.

UNIT-3

Study of Analog transmission: Digital to Analog Conversion, Analog to Analog Conversion.

Study of Multiplexing: Many to one/one to Many, Frequency division Multiplexing, Wage division Multiplexing, Time division Multiplexing, Multiplexing applications.

UNIT-4

Types of transmission media: Guided Media, Unguided Media, Transmission Impairments, Performance Wavelength, Shannon Capacity, Media Comparison, PSTN, Switching.

Error Detection and Correction: Types of Errors, Detection, Parity Check, Vertical Redundancy Check Longitudinal Redundancy Check, Cyclic Redundancy Check, Checksum, Error Correction.

UNIT-5

Study of DTE-DCE in brief: Digital data transmission, DTE-DCE Interface, Modems, 56K Modems, Cable Modems.

Introduction to networks and devices: Network classes, Repeaters, Hub, Bridges, Switches, Routers, Gateways Routers, Routing Algorithms, Distance Vector Routing, Link State Routing.

Text Books:

1. Data communication & Networking by Bahrouz Forouzan.
2. Computer Networks by Andrew S. Tanenbaum

Reference Books:

1. Data and Computer Communications by William Stallings
2. Kleinrock, Leonard. *Queueing Systems, Vol 1: Theory*. New York, NY: Wiley J., 1975. ISBN: 0471491101.

B. Tech VIII Semeste

L	T	P	C
2	0	0	2

18EC8T09- Renewable Energy sources

OPEN ELECTIVE-V

COURSE OBJECTIVE:

1. introduces basics of solar energy like solar radiation, collection, storage and application.
2. introduces the wind energy, biomass energy, geothermal energy and ocean energy

COURSE OUTCOMES:

1. Understand the basics of various renewable energy systems.
2. Understand the concepts of solar energy and wind energy.
3. Understand the concepts of bio-energy
4. Understand the concepts OTEC, geothermal and Ocean Energy
5. Understand the concepts of Ocean Energy

UNIT-I

Introduction: Introduction to energy sources, reserves and estimates, global energy scenario, renewable energy - environment implications, global warming and climate change, limitations of conventional energy sources, classification of non-conventional energy sources - solar energy, wind energy, bio-energy, *Ocean Thermal Energy Conversion* (OTEC), tidal, geothermal and hydro.

UNIT-II

Solar Radiation , Solar Energy Collection & Photovoltaic Energy Conversion

environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface,
instruments for measuring solar radiation and sun shine, solar radiation
data. Flat plate and concentrating collectors, classification of
concentrating collectors

Solar cell fundamentals, solar cell classification, performance of solar cell- power from solar module.

UNIT-III

Wind energy: Wind energy and its application, types of wind mills and their characteristics, elementary design principles, wind energy conversation system, determination of torque coefficient, wind energy storage -applications - hybrid (wind & solar)systems.

UNIT-IV

Bio-energy: Biomass and its sources, energy plantation, production of fuel wood, bio-conversion processes, bio-gas, bio-diesel and ethanol production and utilization, thermo-chemical processes, biomass gasification, process, types of reactors, utilization of producer gas for thermal and electricity generation.

UNIT-V

Ocean thermal energy conversion, geothermal and Ocean Energy

open and closed *Ocean thermal energy conversion* cycles, geothermal energy sources,. Tidal energy, wave energy, data, technology options; small hydro turbines, power plant and environmental issues

Text Books:

1. Non-Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2006
2. Renewable Energy resources, Tiwari and Ghosal, Narosa,2005

Reference Books:

1. Renewable Energy Technologies by R. Ramesh, K. Uday Kumar, M. Anandakrishnan, Narosa Publishing House, 1997
2. Non-Conventional Energy Systems by K Mittal, A. H. Wheeler Publishing Company Limited, 01-Jan-1999.

B. Tech VIII Semester

L	T	P	C
2	0	0	2

18EC8T10-Network Security & Cryptography

OPEN ELECTIVE-V

COURSE OBJECTIVES:

The following principles and practice of cryptography and network security are covered:

1. Classical systems, symmetric block ciphers (DES, AES, other symmetric ciphers)
2. Public-key cryptography (RSA, discrete logarithms)
3. Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes,
4. Email and web security
5. Security at the Transport Layer

COURSE OUTCOMES:

1. To be familiar with information security and a clear understanding of its importance.
2. To master protocols for security services
3. To be familiar with network security threats and countermeasures
4. To be familiar with network security designs using available secure solutions (such as PGP, SSL, IPSec, etc)
5. To be familiar with Security at the Transport Layer

UNIT- I:

Introduction: Security Goals, Cryptographic Attacks, Services and Mechanisms Cipher Model, Substitution Techniques, Transportation Techniques.

UNIT- II:

Symmetric Key Cryptography: Traditional Block Cipher Structure, DES algorithm, AES algorithm, Other Ciphers- Blowfish, IDEA, Block Cipher Modes of Operations

UNIT- III:

Asymmetric Key Cryptography: Public Key Cryptography: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, and Elliptic Curve Cryptography

UNIT- IV:

Data Integrity, Digital Signature Schemes & Key Management : Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature.

Security at application layer: PGP and S/MIME,

UNIT -V: Security at the Transport Layer: SSL and TLS **Security at the Network Layer:** IPSec

TEXT BOOKS:

1) Cryptography and Network Security, Behrouz A Forouzan, DebdeepMukhopadhyay, (3e), Mc Graw Hill.

2) Cryptography and Network Security, William Stallings, (6e) Pearson.

REFERENCE BOOKS:

1) Network Security and Cryptography, Bernard Meneges, Cengage Learning.

2) Everyday Cryptography, Keith M.Martin, Oxford.

B. Tech VIII Semester	**L**	**T**	**P**	**C**
	0	0	0	0

18EC8L12-Comprehensive Viva-Voice

A student is required to undertake Comprehensive Viva-Voice To enhance knowledge acquired by him/her during the course of study. The student is expected to present his knowledge in the field of Electronics and communication Engineering and build a complete interest in course. A Comprehensive Viva-Voice shall be carried out by a individual student. They shall attend before a three-member committee consisting of Head of the Department and Two Senior Faculty members Also the Supervisor

B.TECH III SEMESTER	**BSC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20CS3T01 NUMERICAL METHODS AND VECTOR CALCULUS

Course objectives:

- Understand the basic numerical methods to solve simultaneous linear equations
- Knowledge of numerical methods to solve ordinary differential equations
- The types of integration over the lines, surfaces & volumes

Course Outcomes:

By the end of the course students will be able to

CO1: Determine the solution of transcendental equations by different numerical methods

CO2: Provide the interpolation techniques which analyze the data of an unknown function

CO3: Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries

CO4: Evaluate areas and volumes using double & triple integrals.

CO5: Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.

SYLLABUS

UNIT I: Numerical Solution of Equations:

Solution of Algebraic and transcendental equations: Bisection method, Method of false position and Newton-Raphson method. Iterative methods of solution of linear simultaneous equations: Jacobi's and Gauss-Seidel iteration methods.

UNIT II: Interpolation:

Forward and backward, relation between these operators, Differences of a polynomial, Interpolation with unequal intervals: Lagrange's interpolation formula, Newton's forward & backward interpolation formulae & problems.

UNIT III: Numerical Integration & Numerical Solutions of ordinary differential equations with initial conditions:

Numerical Integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th rules.

Numerical Solution of ODE: Picard's method, Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta method of 4^{th} order.

UNIT IV: Multiple Integrals:

Double integrals in Cartesian & polar coordinates, Change of order of integration, Triple integrals, Change of variables (Cartesian to Polar, Rectangular coordinates to Cylindrical & Rectangular coordinates to Spherical polar coordinate systems).
Applications: Area enclosed by plane curves, Volume of solids.

Unit-V: Vector Differentiation & Vector Integration:

Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, directional derivatives, Del applied to vector point functions-Div& Curl, physical interpretation of div & curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

Line integral, Green's theorem in the plane (without proof), Surface integrals, Stoke's theorem (without proof), Volume integral, Gauss Divergence theorem (without proof).

Text Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rd Edition, 2014.
2. **B. V. RAMANA,** Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

3. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
4. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH III SEMESTER	PCC	L	T	P	C
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20CS3T02 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Objectives:

- To learn the fundamentals of object-oriented programming.
- To implement object-oriented concepts using Java.
- To understand how to design object-oriented applications using Java.

Course Outcomes:
By the end of the course, the student will be able to

CO1: Understand the concepts of Object-Oriented Programming and Java programming constructs.
CO2: Demonstrate the concepts – Strings, Inheritance and Interfaces.
CO3: Build efficient and error-free codes using exception handling and demonstrate multi-threading.
CO4: Design GUI applications using Event Handling and Abstract Window Toolkit.
CO5: Develop real-time applications using Applets and Swings.

SYLLABUS

UNIT-I:
Introduction to OOP, procedural programming language vs. object-oriented language, principles of OOP, applications of OOP, history of java, java features, JVM. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting.

Control Statements: Introduction, if statement, Nested if statement, if–else statements, Ternary Operator, Switch Statement, **Iteration Statements:** while statement, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

Classes and objects: class declaration, creating objects, methods, method overloading, constructors and constructor overloading, garbage collector.

UNIT-II:

Basic Input-Output Operations. String, String Buffer and String Tokenizer classes.

Inheritance: types of inheritance, super keyword, final keyword, overriding and abstract class.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, importance of static keyword, this keyword, arrays, command line arguments, nested classes.

UNIT-III:

Packages and Java Library: creating and using packages, importance of CLASSPATH and java. Lang package.

Exception handling: importance of try, catch, throw, throws and finally block, user-defined exceptions, Assertions.

Multithreading: Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. File Handling: Reading data from files and writing data to files, random access file.

UNIT-IV

Event Handling: Events, Event sources, Event classes, Event Listeners, Event Delegation model, handling mouse and key board events, Adapter classes, inner classes.

AWT: Class hierarchy, user- interface components- labels, button, canvas, scrollbars, text components, checkbox, checkbox groups, choices, list panes-scroll pane, dialogs, menu bar, graphics, layout manager- layout manager types-boarder, grid, flow, card and grid bag.

UNIT-V

Applets: Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Swings: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing – J Applet, J Frame and J Component, Icons and Labels, text fields, buttons-The J Button class, Check boxes, Radio Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees and Tables.

TEXT BOOKS:

1. Herbert Schildt —Java The Complete Reference, 11th Edition, McGraw-Hill Education.
2. E Balagurusamy —Programming with Java: A Primer, 4th Ed, Tata McGraw Hill Education Pvt Ltd.

REFERENCE BOOKS:

1. Java Programming, K.Rajkumar. Pearson
2. Core Java, Black Book, R Nageswara rao, Wiley, Dream Tech
3. Core Java for Beginners, Rashmi Kanta Das, vikas.
4. Object Oriented Programming Through java, P. Radha Krishna, Universities Press.
5. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.
6.

B.TECH III SEMESTER	PCC	L	T	P	C
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20CS3T03 DATABASE MANAGEMENT SYSTEMS

Course Objectives:

- Understand the basic database concepts, applications, schema and various models.
- Familiarize with entity relation model for a data base and write queries using SQL.
- Emphasize the importance of normalization, transaction management and concurrency control in databases.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

CO1: Understand the concept of database, database models and familiarize with Entity Relationship models.

CO2: Demonstrate the use of constraints, relational algebra operations.

CO3: Apply SQL queries to interact with database and understand the basics of NOSQL.

CO4: Apply normalization in database design to eliminate anomalies.

CO5: Understand the basic concepts of transaction processing and concurrency control.

SYLLABUS:

Unit – I:

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS.

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model.

Unit – II:

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

Unit – III: SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

NOSQL: Definition of NOSQL, History of NOSQL and Different NOSQL products, Applications, features of NoSQL, Difference between SQL and NoSQL.

Unit-IV: **Schema Refinement (Normalization):** Introduction to Schema Refinement, Functional Dependencies Reasoning about FDs, Normal Forms, Properties of decomposition, Normalization, Schema refinement in database design, Other kinds of dependencies.

Unit-V: Transaction Management and Concurrency Control: Properties of transactions, Transactions and Schedules, Concurrent execution of transactions, Lock-based concurrency control, deadlocks, Performance of locking.

Concurrency control: 2PL, Serializability, recoverability, Introduction to lock management, dealing with deadlocks.

Text Books:

1. Raghu rama Krishnan, Johannes Gehrke, "Data base Management Systems", 3rd Edition, TATA McGraw Hill.
2. "Professional NOSQL" by Shashan k Tiwari, 2011, WROX Press.

Reference Books:

1. Peter Rob & Carlos Coronel, "Data base Systems design, Implementation, and Management", 7th Edition, Pearson Education, 2000.
2. Silberschatz, Korth, "Data base System Concepts", 6th Edition, McGraw Hill, 2010.
3. ElmasriNavathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2007.
4. C.J.Date, "Introduction to Database Systems", 7th Edition, Pearson Education, 2002.

B.TECH III SEMESTER	PCC	L	T	P	C
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20CS3T04 SOFTWARE ENGINEERING

Course Objectives

- Gain knowledge about software process models.
- Familiarize the basic software engineering methods, practices and its applications.
- Facilitate students in software design.

Course Outcomes

CO1: Understand the software life cycle models.

CO2: Understand the scrum approach to agile project management.

CO3: Analyze the software requirements and generate SRS document.

CO4: Understand some of the different models that may be used to design.

CO5: Understand various software testing approaches and quality control to ensure good quality software.

SYLLABUS

UNIT – I

INTRODUCTION TO SOFTWARE ENGINEERING: Nature of software, Software engineering, The Software Processes, Software Myths.

PROCESS MODELS: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialised Process models, The Unified Process, Personal and Team Process Models.

UNIT – II

REQUIREMENTS ENGINEERING: Functional and Non-Functional Requirements, The Software Requirements Document, Requirements Specification, requirements Engineering, Requirements Elicitation and Analysis, Requirement Validation, Requirement Management.

REQUIREMENTS MODELLING: Requirement Analysis, Scenario-Based Modelling, Data Modelling Concepts, Class-Based Modelling.

UNIT – III

DESIGN CONCEPTS: The Design Process, Design Concepts, The Design Models, Architectural Design: Software Architecture, Architectural Genres, Architectural Styles. User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

UNIT – IV

Understanding of UML diagrams: Structural diagrams - class diagram, object diagram, component diagram, deployment diagram, Behavioural diagrams - Use-case diagram, activity diagram, sequence diagram, collaboration diagram, state chart diagram.

UNIT – V

IMPLEMENTATION: Structured coding Techniques, Coding Styles-Standards and Guidelines, Implementation Issues.

SOFTWARE TESTING STRATEGIES: A Strategic approach to Software Testing, Strategic Issues and Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging, White-Box Testing, Black Box Testing, Software Quality concepts.

TEXT BOOKS:

1. Roger S. Pressman (2010), Software Engineering, A Practitioner's Approach, 7th Edition, McGraw-Hill International Edition, India.
2. Ian Sommerville (2011), Software Engineering, 9th Edition, Pearson education, India.
3. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Ph.D.Jim ConallenKelli A. Houston," Object-Oriented Analysis and Design with Applications", 3rd edition.

REFERENCES BOOKS:

1. Pankaj Jalote (2010), Software Engineering, A Precise Approach, Wiley India.
2. Waman S. Jawadekar (2008), Software Engineering: A Primer, McGraw-Hill, India.
3. Hans Van Vilet (2008), Software Engineering Principles and Practice, 3rd Edition, John Wiley & Sons Ltd.
4. Rajib Mall (2005), Fundamental of Software Engineering, PHI.
5. Deepak Jain, Software Engineering, Principles and Practices, Oxford, University Press, India.

B.TECH III SEMESTER	PCC	L	T	P	C
		3	0	0	3

20CS3T05 COMPUTER ORGANIZATION

PREREQUISITES: Digital logic design

Course Objectives:

- To understand the design of various functional units and components of computers.
- Emphasizes basic organization, design, and programming of a simple digital computer.
- To explain the function of each element of a memory hierarchy.
- To identify and compare different methods for computer IO.

Course Outcomes:

CO1: Understand the architecture of a modern computer with its various processing units.

CO2: Understand RTL, micro-operations, instruction cycle.

CO3: Understand the features of hardwired and micro programmed control units.

CO4: Analyze the memory hierarchy system and performance improvement by cache memory.

CO5: Analyze the communication methods of I/O devices and standard I/O interfaces.

SYLLABUS:

UNIT I:

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation, Other Binary codes (Gray Code), Other decimal codes (BCD, Weighted code, Excess-3), Error Detection codes.

UNIT II:

Register Transfer and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT III:

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: Stack Organization**,** Instruction formats, Addressing modes, Data Transfer and Manipulation Instructions, Program control Instructions, RISC

UNIT IV:

Computer Arithmetic: Addition and subtraction, Booth multiplication Algorithm.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, virtual Memory, Memory Management hardware.

UNIT V:

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

Input - Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access, IOP, Serial Communication.

TEXT BOOKS

1. Computer Systems Architecture ― M. Morris Mano, Pearson Education Publishers, 3rdedition.

REFERENCE BOOKS:

1. William Stallings, ― Computer Organization and Architecture, 6th Edition Pearson/ PHI publishers.
2. Andrew S. Tanenbaum, ―Structured Computer Organization, Pearson / PHI publishers,
   4th edition.
3. John D Carpinelli, ― Computer Systems Organization and Architecture ‖, Pearson Education, 1st edition.
4. Carl Hamacher, ZvonkoVranesic, Safwat Zaky, ― Computer Organization, TMH publications, 5th edition.

			L	T	P	C
B.TECH III SEMESTER		**PCC**	**0**	**0**	**3**	**1.5**

20CS3L06 **OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**

Course Objectives:

- Understand fundamentals of Object-Oriented Programming in java including defining classes, invoking methods using class libraries etc.,
- Demonstrate an understanding of graphical user interfaces, multi-threaded programming and event driven programming.

Course Outcomes: By the end of the course student will be able to

CO1: Implement java applications using OOP principles and proper program structuring.

CO2: Develop java programs using packages, inheritance and interfaces.

CO3: Implement error and exception handling techniques.

CO4: Design event driven GUI and real-time web related applications.

LIST OF EXPERIMENTS

Exercise - 1 (Basics)

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b) Write a JAVA program to sort for an element in a given list of elements using bubble sort

c) Write a JAVA program to sort for an element in a given list of elements using merge sort.

d) Write a JAVA program using String Buffer to delete, remove character.

Exercise - 3 (Class, Objects)

Implement java programs using the concept of

a) Class mechanism. Create a class, methods and invoke them inside main method.

b) Constructor.

c) Constructor overloading.

b) Method overloading.

Exercise -4 (Inheritance)

Implement java programs using the concept of

a) Single Inheritance

b) Multilevel Inheritance

c) Abstract class

Exercise - 5 (Inheritance - Continued)

Implement java programs using the concept of

a)“super” keyword. b) Interfaces

Exercise – 6 (Runtime Polymorphism)

a) Write a JAVA program that implements Runtime polymorphism

Exercise – 7 (Exception)

Implement the programs by using the concepts of

a. Exception handling mechanism

b. Multiple catch clauses

c. Finally

d. Creating user defined exceptions

Exercise – 8 (Threads)

a) Write a JAVA program that creates threads by extending Thread class. First thread displays “Good Morning” every 1 sec, the second thread displays “Hello” every 2 seconds and the third display “Welcome” every 3 seconds,(Repeat the same by implementing Runnable)

b) Write a program illustrating isAlive and join ()

c) Write a Program illustrating Daemon Threads.

Exercise – 9 (Packages)

a) Create a user defined package and demonstrate different ways of importing packages

Exercise - 10 (Applet)

a) Write a JAVA program to paint like paint brush in applet.

b) Write a JAVA program to create different shapes and fill colors using Applet.

Exercise -11 (Event Handling)

a) Write a JAVA program that display the x and y position of the cursor movement using Mouse.

b) Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

		L	T	P	C
B.TECH III SEMESTER	**PCC**	**0**	**0**	**3**	**1.5**

20CS3L07 DATABASE MANAGEMENT SYSTEMS LAB

PREREQUISITES: -

Course Objectives:

- Populate and query a database using SQL - DDL/DML commands.
- Understand various advanced query executions such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.
- Develop solutions using PL/SQL for database applications using procedures, cursors and triggers

COURSE OUTCOMES:

1. Design database schema for a given application and apply normalization
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers
4. Develop solutions using PL/SQL procedures.

LIST OF EXPERIMENTS

1. Introduction to SQL: DDL, DML, DCL, TCL.
2. Queries for Creating Tables with Constraints, Views.
3. Example SQL Queries using select.
4. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN).
5. Queries using Group By, Order By, and Having Clauses and Working with Index, Sequence, Synonym.
6. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
7. Queries on Joins and Correlated Sub-Queries.
8. Write a PL/SQL Code using Basic Variable, Anchored declarations, and Usage of Assignment Operation.
9. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL.
10. Write a PL/SQL block using SQL and Control Structures in PL/SQL.
11. Write a PL/SQL Code using Cursors, Exceptions and Triggers.
12. Write a PL/SQL Code using Procedures, Functions, and Packages.

Text Books:

1. ORACLE PL/SQL by example, Benjamin Rosen Zweig, Elena Silvestrova,

Pearson.
2. ORACLE database log PL/SQL programming SCOTT URMAN, TMH.
3. SQL and PL/SQL for ORACLE 10g, Black Book, Dr. P.S Deshpande.
4. Data Base Management System, Oracle SQL and PL/SQL, Pranab Kumar Das Gupta, P Radha Krishna, PHI.

B.TECH III SEMESTER	PCC	L	T	P	C
		0	0	3	1.5

20CS3L08 SOFTWARE ENGINEERING LAB

COURSE Objectives:

- To provide hands-on experience with different aspects of Software Engineering including requirements identification, implementation, testing, and so on.
- To draw DFD, behavioural and structural design using UML diagrams.

COURSE OUTCOMES:

- Prepare SRS document, design document, test cases and software configuration management and risk management related document.
- Develop function oriented and object-oriented software design using tools like rational rose.
- Design and develop Test Cases for a system
- Track the progress of a project using various tools.

LIST OF EXPERIMENTS

1. Create the problem statement for a specific system of relevance.
2. Perform requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
3. To carry out the function-oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4. To draw UML diagrams.
5. To illustrate the test cases, test case preparation and perform Manual Tests.
6. Perform Estimation of effort using FP Estimation for chosen system.
7. To prepare time line chart/Gantt Chart/PERT Chart for selected software project

S. No	Case Study
1	Credit Card Processing
2	Stock Maintenance System
3	Online course reservation system
4	Recruitment system
5	Passport automation System
6	Online Exam Registration

Note: Students shall prepare a document related to all the above activities for at least three real time Case Studies listed below.

B.TECH III SEMESTER	SC	L	T	P	C
		0	0	4	2

20CS3S09 **Python NumPy and Pandas (Skill Oriented Course)**

Course Objectives:

- To acquire programming skills in Python package NumPy and perform mathematical and statistical operations.
- To understand the fundamentals of the Pandas library in Python and how it is used to handle data and also develop basic skills in data analysis and visualization

Course Outcomes: By the end of this lab the student is able to

CO1: Understand the workings of various numerical techniques, different descriptive measures of Statistics, correlation and regression to solve the engineering problems.

CO2: Understand how to apply some linear algebra operations to n-dimensional arrays.

CO3: Understand how NumPy perform common data wrangling and computational tasks in Python.

CO4: Use Pandas to create and manipulate data structures like Series and DataFrames.

CO5: Work with arrays, queries, and dataframes

NumPy Exercises:

1. NumPy Installation using different scientific python distributions(Anaconda, Python(x,y), WinPython, Pyzo)
2. NumPy Basics (np.array, np.arrange, np.linespace, np.zeros, np.ones, np.random.random, np.empty)
3. Arrays (array.shape, len(array), array.ndim, array.dtype, array.astype(type), type(array))
4. Array Manipulation (np.append, np.insert, np.resize, np.delete, np.concatenate, np.vstack, np.hstack)
5. Mathematical Operations(np.add, np.substract, np.divide, np.multiply, np.sqrt, np.sin, np.cos, np.log, np.dot, np.roots) , Statistical Operations(np.mean, np.median, np.std, array.corrcoef( ))
6. NumPy data types
7. NumPy ndarray
8. NumPy String Operations
9. NumPy Linear Algebra Operations(norm,eigen values and vectors, determinant of a matrix, sum of diagonal elements, inner product, matrix decomposition

etc..)
10. NumPy Functional Programming

Pandas Exercises:

11. Pandas DataSeries:

1. Write a Pandas program to create and display a one-dimensional array-like object
   containing an array of data using Pandas module.
2. Write a Pandas program to convert a Panda module Series to Python list and it's type.
3. Write a Pandas program to add, subtract, multiple and divide two Pandas Series.
4. Write a Pandas program to convert a NumPy array to a Pandas series.

Sample Series:

NumPy array: [10 20 30 40 50]

Converted Pandas series: 0 10
1 20
2 30
3 40
4 50
dtype: int64

12. Pandas DataFrames: Consider Sample Python dictionary data and list labels:

exam_data = {'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'], 'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19], 'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1], 'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']}

labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']

1. Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels.
2. Write a Pandas program to change the name 'James' to 'Suresh' in name column of the DataFrame.
3. Write a Pandas program to insert a new column in existing DataFrame.
4. Write a Pandas program to get list from DataFrame column headers.
5. Write a Pandas program to get list from DataFrame column headers.

13. Pandas Index:

1. Write a Pandas program to display the default index and set a column as an Index in a given dataframe.
2. Write a Pandas program to create an index labels by using 64-bit integers, using floating-point numbers in a given dataframe.

14. Pandas String and Regular Expressions:
    1. Write a Pandas program to convert all the string values to upper, lower cases in a given pandas series. Also find the length of the string values.
    2. Write a Pandas program to remove whitespaces, left sided whitespaces and right sided whitespaces of the string values of a given pandas series.
    3. Write a Pandas program to count of occurrence of a specified substring in a DataFrame column.
    4. Write a Pandas program to swap the cases of a specified character column in a given DataFrame.
15. Pandas Joining and merging DataFrame:
    1. Write a Pandas program to join the two given dataframes along rows and assign all data.
    2. Write a Pandas program to append a list of dictionaries or series to a existing DataFrame and display the combined data.
    3. Write a Pandas program to join the two dataframes with matching records from both sides where available.
16. Pandas Time Series:
    1. Write a Pandas program to create
        a. Datetime object for Jan 15 2012.
        b. Specific date and time of 9:20 pm.
        c. Local date and time.
        d. A date without time.
        e. Current date.
        f. Time from a datetime.
        g. Current local time.
    2. Write a Pandas program to create a date from a given year, month, day and another date from a given string formats.
    3. Write a Pandas program to create a time-series with two index labels and random values. Also print the type of the index.
17. Pandas Grouping Aggregate:

Consider dataset:

School	class	name	date_Of_Birth	age	height	weight	address
S1 s001	V	Alberto Franco	15/05/2002	12	173	35	street1
S2 s002	V	Gino Mcneill	17/05/2002	12	192	32	street2
S3 s003	VI	Ryan Parkes	16/02/1999	13	186	33	street3
S4 s001	VI	Eesha Hinton	25/09/1998	13	167	30	street1

S5 s002	V	Gino Mcneill	11/05/2002	14	151	31	street2
S6 s004	VI	David Parkes	15/09/1997	12	159	32	street4
S1 s001	V	Alberto Franco	15/05/2002	12	173	35	street1

1. Write a Pandas program to split the following dataframe into groups based on school code. Also check the type of GroupBy object.
2. Write a Pandas program to split the following dataframe by school code and get mean, min, and max value of age for each school

18. Pandas Styling:
    1. Create a dataframe of ten rows, four columns with random values. Write a Pandas program to highlight the negative numbers red and positive numbers black.
    2. Create a dataframe of ten rows, four columns with random values. Write a Pandas program to highlight the maximum value in each column.
    3. Create a dataframe of ten rows, four columns with random values. Write a Pandas program to highlight dataframe's specific columns.
19. Excel:
    1. Write a Pandas program to import excel data into a Pandas dataframe.
    2. Write a Pandas program to find the sum, mean, max, min value of a column of file.
20. Plotting:
    1. Write a Pandas program to create a horizontal stacked bar plot of opening, closing stock prices of any stock dataset between two specific dates.
    2. Write a Pandas program to create a histograms plot of opening, closing, high, low stock prices of stock dataset between two specific dates.
    3. Write a Pandas program to create a stacked histograms plot of opening, closing, high, low stock prices of stock dataset between two specific dates with more bins.
21. Pandas SQL Query:
    1. Write a Pandas program to display all the records of a student file.
    2. Write a Pandas program to select distinct department id from employees file

References:

1. https://www.w3resource.com/python-exercises/pandas/index.php
2. https://www.w3resource.com/python-exercises/numpy/index.php

B.TECH III SEMESTER		**MC**	**L**	**T**	**P**	**C**
			2	**-**	**-**	**-**

20CS3M10 CONSTITUTION OF INDIA

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative

Course Outcomes:

At the end of the course, the student will be able to have a clear knowledge on the following:

CO1: Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.

CO2: Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

CO3: Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India.

CO4: Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.

CO5: Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy.

SYLLABUS

UNIT I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution -Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II

Union Government and its Administration Structure of the Indian Union: Federalism, CentreState relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, Rajya Sabha, The Supreme

Court and High Court: Powers and Functions;

UNIT III

State Government and its Administration Governor, Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT IV

A.Local Administration, District's Administration Head, Role and Importance, Municipalities, Mayor and role of Elected Representative, CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy(Different departments),

Village level, Role of Elected and Appointed officials, Importance of grass root democracy

UNIT V

Election Commission: Election Commission, Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

References:

1) Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Pvt. Ltd.

2) Subash Kashyap, Indian Constitution, National Book Trust

3) J.A. Siwach, Dynamics of Indian Government & Politics

4) D.C. Gupta, Indian Government and Politics

5) H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

6) J.C. Johari, Indian Government and Politics Hans

7) J. Raj Indian Government and Politics

8) M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

9) Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

E-sources:

1) nptel.ac.in/courses/109104074/8

2) nptel.ac.in/courses/109104045/

3) nptel.ac.in/courses/101104065/

4) www.hss.iitb.ac.in/en/lecture-details

5)www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

B.TECH IV SEMESTER **BSC**

L	T	P	C
3	0	0	3

20CS4T01 PROBABILITY AND STATISTICS

Course objectives:

- Computation of expectation and variance for probability distributions of a random variable
- Description of sampling, distribution of means, proportions & variances
- Knowledge of different distributions to test statistical hypothesis

Course Outcomes:

By the end of the course students will be able to

CO1: Understand random variables and discrete probability distributions

CO2: Determine probabilities based on practical situations using the normal distributions

CO3: Apply different distributions to compute confidence intervals

CO4: Test the hypothesis concerning means and proportions

CO5: Understand the concept of least square estimation linear regression

Syllabus:

UNIT I: Discrete Random variables and Distributions:

Introduction-Random variables- Discrete Random variable-Distribution function-Expectation-Moment Generating function-Moments and properties. Discrete distributions: Binomial and Poisson distributions.

UNIT II: Continuous Random variable and distributions:

Introduction-Continuous Random variable-Distribution function- Expectation-Moment Generating function-Moments and properties. Continuous distribution: Normal distributions, Normal approximation to Binomial distribution.

UNIT III: Sampling Theory:

Introduction - Population and samples- Sampling distribution of means (s known)-Central limit theorem- t-distribution- Sampling distribution of means (s unknown)-Sampling, distribution of variances, Point estimation- Maximum error of estimate - Interval estimation.

UNIT IV: Tests of Hypothesis:

Introduction –Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors –Level of significance - One tail and two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences- ANOVA for one-way and two-way classified data.

UNIT V: Regression Analysis:

The method of Least squares, Curvilinear Regression, Multiple Regression, Correlation.

Text Books:

1. **Richards A Johnson, Irvin Miller and Johnson E Freund**. Probability and Statistics for Engineering, 9th Edition, PHI.
2. **Jay l. Devore,** Probability and Statistics for Engineering and the Sciences, 8th edition, Cengage.

Reference Books:

3. **ShronL.Myers, Keying Ye, Ronald E Walpole,** Probability and StatisticsEngineers and the Scientists,8th Edition, Pearson 2007.
4. **William Menden Hall, Robert J. Bever and Barbara Bever**, Introduction toprobability and statistics, Cengage learning, 2009.

B.TECH IV SEMESTER	ESC	L	T	P	C
		3	0	0	3

20CS4T02 DISCRETE MATHEMATICAL STRUCTURES

Course objectives:

- The validity or the strength of any particular argument or reasoning
- Knowledge of the theory of relations and functions
- Knowledge of types of graphs to apply in real life problems

Course Outcomes:

By the end of this course the student will be able to

CO1: Apply mathematical logic to design new programming languages

CO2: Illustrate the properties of sets and functions to design a modeling software system

CO3: Explain a structure of an algebra which is useful to understand the theory of sequential machines, formal languages and coding theory.

CO4: Apply the techniques of recursion for representing the data in the analysis of algorithms

CO5: Provide the knowledge of graphs such as trees which is useful in maintaining files and directories by Operating Systems.

SYLLABUS

UNIT-I: Mathematical Logic:

Introduction, Statements and Notation, Connectives and Truth tables, Normal forms, Theory of inference for Statement Calculus, The Predicate Calculus, Inference theory of Predicate calculus.

UNIT-II: Set Theory & Functions:

Introduction, Basic concepts of set theory, Principle of Inclusion and Exclusion, Properties of Binary relations, Relation matrix and Digraph, operations on relations, Partition and covering, Transitive closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, Bijective functions, Inverse functions, Composition of functions, Recursive functions, Pigeonhole principle and its applications.

UNIT-III: Algebraic Structures & Number Theory:

Algebraic systems and examples, general properties, semigroup, monoid, groups and subgroups. Properties of integers, Division algorithm, Greatest common divisor, Euclidean algorithm (without proof), Least common multiple, testing of prime numbers, The fundamental theorem of Arithmetic, Fermat's theorem and Euler's theorem (without proofs) and its applications.

UNIT-IV

Recurrence Relations: Recurrence relations, solving recurrence relations by substitution, the method of characteristic roots, Solutions of Inhomogeneous recurrence relations.

UNIT -V:

Graph Theory: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Coloring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

TEXT BOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.
2. Mathematical Foundation for Computer science, S. Santha, E.V. Prasad, Cengage publications.

REFERENCE BOOKS:

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H.Rosen, 7th Edition, Tata McGraw Hill.
2. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI.

B.TECH IV SEMESTER	PCC	L	T	P	C
		3	0	0	3

20CS4T03 OPERATING SYSTEMS

Course Objectives

- Understand the importance of Operating System and its services.
- To impart the concepts of process, memory and file management techniques.
- To familiarize with the deadlock handling techniques.

Course Outcomes

CO1: Understand the importance, functions and structures of operating systems.

CO2: Analyze and compare the performance of various CPU scheduling algorithms.

CO3: Develop software or hardware-based solutions for process synchronization.

CO4: Apply deadlock handling techniques to avoid deadlocks.

CO5: Compare various Memory Management Schemes and analyze various disk Scheduling Algorithms.

Syllabus

UNIT-I:

Introduction: Defining operating system, operating system structures, operating systems operations, User and Operating-System Interface, Operating-system services, System calls: Types of system calls, operating system debugging, System Boot.

Study of Linux System: Components of LINUX, Inter process Communication.

UNIT-II:

Process Management: Process Concept, Process state, Process control block (PCB), Process scheduling, Scheduling queues, Schedulers, Operations on Processes, Process creation, Process Termination, Process, Inter process communication.

Multithreaded Programming: Multithreading models, Scheduling: Basic Concepts, Scheduling algorithms

UNIT-III:

Synchronization: The critical section problem, Peterson's solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

File System Interface: File attributes, File operations, Access methods, Directory and Disk structures.

UNIT-IV:

Deadlocks: Deadlock characterization, Methods for handling deadlocks: deadlock-Prevention - Mutual Exclusion, Hold and wait, No preemption, Circular wait, Avoidance-Safe state, Resource allocation, Bankers's Algorithm, Safety Algorithm, Detection-Single instance of each resource type, several instances of a resource type, Detection algorithm usage, recovery from Dead lock

UNIT-V:

Memory Management Strategies: Swapping, Contiguous memory allocation, Paging, Segmentation

Virtual-Memory Management: Demand paging, Page replacement Algorithms, Thrashing.

Mass-storage structure: Magnetic disk, Disk Scheduling.

Text Books

1. Abraham Silberschatz, Peter B, Galvin, Greg Gagne, Operating System, John Wiley, 9thedition.(Unit-1,2,3,4,5)
2. Stallings, Operating Systems - Internal and Design Principles, Pearson education, 6th edition–2005.(Unit-5)

Reference Books

1. D. M. Dhamdhere, Operating systems- A Concept based Approach, TMH, 2nd edition.
2. Andrew S Tanenbaum, Modern Operating Systems, PHI, 4th edition.
3. Charles Crowley ,Operating Systems: A Design-Oriented Approach, Tata Mc Graw Hill Education,1996

B.TECH IV SEMESTER **PCC**

L	T	P	C
3	0	0	3

20CS4T04 ADVANCED DATA STRUCTURES

Course Objectives:

- Describe variety of advanced data structures.
- Understand operations on various search trees.

Course Outcomes:

CO1: Illustrate several sorting algorithms.

CO2: Construct Priority queues such as min heap and max heap for the given data.

CO3: Apply various operations on AVL and Red Black trees

CO4: Build Multi-Way Search Trees and perform various operations.

CO5: Demonstrate various operations of Digital Search Structures and Multi-Way Trees.

SYLLABUS

UNIT - I:

Sorting: Medians and order statistics, External Sorting: Introduction, K-way Merging, Buffer Handling for parallel Operation, Run Generation, Optimal Merging of Runs.

Hashing: Introduction, Hash Table, Hash Function, Types of Hashing: Linear Probing, Quadratic Probing, Double Hashing.

UNIT - II:

Priority Queues: Introduction, types of priority queues, implementation methods of priority queues, Applications of Priority queues,

Heaps: Binary heap: min heap and max heap, Applications of heap.

UNIT – III: Advanced and Efficient Binary Search Trees

Optimal Binary Search Trees: Red Black Trees Definition- Representation of a Red- Black Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree- Joining Red-Black Trees, Splitting a Red-Black tree.

Splay and Scapegoat Trees:

Scapegoat Tree-Definition-Insertion and Deletion operations, Splay tree-Definition-Insertion and Deletion operations.

UNIT - IV: Multi-way Trees

M-Way Search Trees: Definition and Properties, Searching an M-Way SearchTree, B-Trees, Definition and Properties, Number of Elements in a B-tree, Insertion into B-Tree, Deletion from a B-Tree, B+-Tree Definition, Searching a B+-Tree, Insertion into B+-tree, Deletion from a B+-Tree.

UNIT - V: Digital Search Trees and Multi - way Trees

Digital Search Trees: Definition, Search, Insert and Delete. Binary Tries, Compressed Binary Tries.

Multi-way Trees: Definition, searching a Tree, sampling strategies, Insertion, Deletion, Height of a Tree. Prefix Search and applications. Suffix Trees.

Text Books:

1. Richard F Gilberg, Behrouz A Forouzan, "Data Structures, a Pseudo code Approach with C", Cengage Learning. (Unit 1,2,3,4 & 5)
2. Horowitz, Sahni, Anderson-Freed, "Fundamentals of Data Structures in C", 2nd edition, University Press.

Reference Books:

1. Reema Thareja, S.RamaSree, "Advanced Data Structures"Oxford Higher Education.
2. Mark Allen Weiss, "Data structures and Algorithm Analysis in C", Pearson, 2nd edition
3. Introduction to Algorithms", T. Cormen, R.Rivest, C. Stein, C. Leiserson, PHI publication, Second Edition, 2004, ISBN 81-203-2141-3.

B.TECH IV SEMESTER	HSMC	L	T	P	C
		3	0	0	3

20CS4T05 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- The Learning objectives of this course are to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting
- To familiarize about the Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation
- Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals

Course Outcomes:

CO1: The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product

CO2: The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs

CO3: The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units

CO4: The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis

CO5: The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making

SYLLABUS

UNIT I: Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand-Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT II: Theories of Production and Cost Analyses: Theories of Production function- Law of Variable Proportions - Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

UNIT III: Introduction to Markets, Theories of the Firm & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles: Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms.

UNIT IV: Introduction to Accounting & Financing Analysis: Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

UNIT V: Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Text Books:

1) A R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

Reference Books:

1) Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & Company Ltd.
2) JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition edition
3) N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & Company Ltd.
4) MaheswariS.N,AnIntroduction to Accountancy, Vikas Publishing House Pvt Ltd
5) I.M Pandey, Financial Management , Vikas Publishing House Pvt Ltd
6) V. Maheswari, Managerial Economics, S. Chand & Company Ltd.

B.TECH IV SEMESTER	**ESC**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

20CS4L06 R PROGRAMMING LAB

Course Outcomes:

CO1: Understand the use of operators in R

CO2: Use Data Structures to implement programs in R

CO3: Implement Mathematical functions in R

CO4: Understand reading and writing files

CO5: Analyze data from various sources

LIST OF EXPERIMENTS

Exercise 1: Implement programs in R to work with different types of operators

Exercise 2: Implement programs in R with data structures

Exercise 3: Implement programs in R using the concept of functions

Exercise 4: Working with simulation in R

Math functions

Calculus

Linear algebraic operations

Set operations

Exercise 5: Reading in your own data

Working with files

Accessing the keyboard and monitor

Exercise 6: Data visualization

Charts and plots

Exercise 7:

a) Program to implement simple and multiple linear regression.

b) Program to implement non- linear regression.

Exercise 8:

a) Program to implement logistic regression.

Exercise 9:

a) Program to perform ANOVA test (one-way, two way)

B.TECH IV SEMESTER	PCC	L	T	P	C
		0	0	3	1.5

20CS4L07 OPERATING SYSTEMS LAB

Course Objectives

- To develop the concepts of process and memory management techniques.
- To know the problems of deadlock and study the various handling mechanisms.
- To impart knowledge on developing shell scripts.

Course Outcomes

CO1: Implement CPU and disk scheduling algorithms.

CO2: Demonstrate memory management techniques.

CO3: Demonstrate algorithms for Deadlock Detection and prevention.

CO4: Develop shell scripts in order to perform shell programming.

List of Experiments

1. Simulate the following CPU scheduling algorithms
   a) FCFS b) SJF
2. Simulate the following CPU scheduling algorithms
   a) Priority b) Round Robin
3. Simulate MVT and MFT
4. Simulate the following page replacement algorithms
5. Simulate the following page replacement algorithms
6. Implement FIFO page replacement algorithm.
7. Implement LRU page replacement algorithm.
8. Illustrate Dead Lock Avoidance Algorithm
9. Illustrate Dead Lock Detection Algorithm
10. Simulate the following disk scheduling algorithms
    a) FCFS b) SSTF
11. Simulate the following disk scheduling algorithms
    a) SCAN b) CSCAN
12. Illustrate UNIX commands and Vi editor
13. Write a Shell program to check the given number is even or odd
14. Write a shell script to print the factorial of first n natural numbers.
15. Write shell scripts to find the length of a given string and to extract a substring from a given string.
16. Write a shell script that counts the number of lines and words present in a given file.

B.TECH IV SEMESTER	**PCC**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

20CS4L08 ADVANCED DATA STRUCTURES LAB

Objectives:

• To make the student learn a object oriented way of solving problems.

• To make the student learn different sorting algorithms.

• To make the student learn different algorithm design techniques.

Course Outcomes

CO1 - Develop programs for sorting.

CO2 - Develop programs for implementing trees and their traversal operations.

CO3 - Implement graph traversal algorithm. .

List of Experiments

1. Construct a Hash Table and illustrate
   a) Linear Probing b) Quadratic Probing c) Double Hashing
2. Write programs for the implementation of Priority Queue.
3. Write a program to implement operations on binary heap.
4. Write a program to perform the following operations
   a) Insertion into an AVL-tree b) Deletion from an AVL-tree
5. Write a program to perform the following operations
   a) Insertion into a B-tree b) Deletion from a B-tree
6. Write a program to perform the following operations
   a) Insertion into Scapegoat tree b) Deletion from an Scapegoat tree
7. Write a program to perform the following operations
   a) Insertion into Splay tree b) Deletion from an Splay tree
8. Write a program to implement Kruskal's algorithm to generate a minimum cost spanning tree.
9. Write a program to implement Prim's algorithm to generate a minimum cost spanning tree.
10. Write a program to implement operations on graph.
    a)vertex insertion b) Vertex deletion c) finding vertex d))Edge addition and deletion
11. Write programs for the implementation of BFS for a given graph.
12. Write programs for the implementation of DFS for a given graph
13. Write a program to implement operations on graph.
    a) Finding vertex b) Edge addition and deletion
14. Write a program to implement Dijkstra's algorithm to find shortest path in the graph.
15. Write a program to implement Bellman-Ford algorithm to find shortest path in the graph

B.TECH IV SEMESTER	SC	L	T	P	C
		0	0	4	2

20CS4S09 **BASIC WEB PROGRAMMING (Skill Oriented Course)**

Course Objectives:

- To acquire skills in developing web pages
- To understand the use of HTML and CSS in designing web pages
- To gain knowledge on Java Script for performing validations

Course Outcomes: By the end of this lab the student is able to

CO1: Understand and use various HTML Tags and apply CSS

CO2: Develop websites that include static pages

CO3: Design Front end for Web Applications

LIST OF EXPERIMENTS

1) Exercises to demonstrate the use of Basic HTML tags.
2) Exercises to demonstrate Tables, Lists and Forms
3) Implement forms using HTML Frames and CSS
4) Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, lines and words in the text entered using an alert message. Words are separated with white space and lines are separated with new line character.
5) Write an HTML page that contains a selection box with a list of 5 countries In the above page when the user selects a country, its capital should be printed next to the list, and add CSS to customize the properties of the font of the capital.
6) Create a website using the HTML and CSS to create your personal portfolio.
7) Create a website using HTML and CSS for a Book Store.
8) Write a JavaScript to design a simple calculator to perform the operations: sum, product, difference and quotient
9) Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in HTML table format.
10) Write a JavaScript code that displays text “TEXT-GROWING” with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays “TEXT-SHRINKING” in BLUE color. Then the font size decreases to 5pt.
11) Demonstrate the Login page with userid and password validations.
12) Develop and demonstrate a HTML5 file that includes JavaScript script that uses functions for the following problems:

a. Parameter: A string Output: The position in the string of the left-most vowel

b. Parameter: A number Output: The number with its digits in the reverse order

13) Write an HTML page with Javascript that takes a number from one text field in the range 0-999 and display it in other text field in words. If the number is out of range, it should show “out of range” and if it is not a number, it should show “not a number” message in the result box.

BIG DATA & HADOOP

IV Year - I Semester **Course Code: 18CS7T01**

Lecture: 3 **Practical: 0** **Internal Marks: 30**

Credits: 3 **Tutorial: 0** **External Marks: 70**

COURSE OBJECTIVES:

1) Optimize business decisions and create competitive advantage with Big Data analytics
2) Introducing Java concepts required for developing map reduce programs
3) Derive business benefit from unstructured data
4) Imparting the architectural concepts of Hadoop and introducing map reduce paradigm

COURSE OUTCOMES:

1) Understand methods for data summarization, query, and analysis.
2) Apply data modeling techniques to large data sets
3) Creating applications for Big Data analytics
4) Building a complete business data analytic solution.
5) Understand programming tools PIG & HIVE in Hadoop eco-system.

SYLLABUS

UNIT-I

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; **Generics:** Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Name node, Data node, Secondary Name node, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III

Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

UNIT-IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators

UNIT-V

Pig: Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

TEXT BOOKS:

1) Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC (Unit 1)
2) Hadoop: The Definitive Guide by Tom White, 3 Edition, O'reilly(Unit 2,3,4)
3) Hadoop in Action by Chuck Lam, MANNING Publ.9(Unit 2)
4) Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss (Unit 5)

REFERENCE BOOKS:

1) Hadoop in Practice by Alex Holmes, MANNING Publ.
2) Hadoop MapReduce Cookbook, SrinathPerera, ThilinaGunarathne

CRYPTOGRAPHY & NETWORK SECURITY

IV Year - I Semester **Course Code: 18CS7T02**

Lecture: 2 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 1 **External Marks: 70**

COURSE OBJECTIVES:

1) Classical systems, symmetric block ciphers (DES, AES, other symmetric ciphers)
2) Public-key cryptography (RSA, discrete logarithms)
3) Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes,
4) Email and web security.

COURSE OUTCOMES:

1) Understand the need of information security andits importance.
2) Apply symmetric security mechanisms for confidentiality
3) Apply asymmetric security mechanisms for confidentiality
4) Apply digital signature techniques for authentication
5) Understand network security designs using available secure solutions (such asPGP, SSL, IPSec)

SYLLABUS

UNIT-I

Introduction: Security Goals, Cryptographic Attacks, Services and Mechanisms, Techniques

Mathematics of Cryptography: Integer Arithmetic, Modular Arithmetic, Matrices , Linear Congruence,

Traditional Symmetric Key Ciphers: Introduction, Cipher Model, Substitution ciphers, Transportation cipher, Stream and Block Ciphers.

UNIT-II

Symmetric Key Encryption:

Mathematics of Cryptography- Algebraic Structures, GF Fields

Modern Symmetric Key Cryptography: Modern Block Ciphers, Modern Stream ciphers

Data Encryption Standard: DES Structure, DES Analysis, Multiple DES, Security of DES

Advanced Encryption Standard: Introduction, Transformations, Key Expansion, Analysis of AES.

UNIT-III

Asymmetric Key Cryptography:

Mathematics of Cryptography: Primes, Primality Testing, Factorization, Chinese Remainder Theorem.

Asymmetric Key Cryptography: Introduction, RSA Cryptosystems, Rabin Cryptosystems, ELGAMAL Cryptosystem, Elliptic Curve CryptoSystem.

UNIT- IV

Data Integrity, Digital Signature Schemes & Key Management:

Message Integrity and Message Authentication

Cryptographic Hash Functions:Introduction, SHA-512, Whirlpool

Digital Signature: Comparison, Process, Services, Attacks on Digital Signature, Digital Signature Shemes

Key Management: Symmetric Key Distribution, Kerberos, Symmetric key Agreement, Public Key Distribution.

UNIT -V

Security at application layer: PGP and S/MIME,

Security at the Transport Layer: SSL and TLS- SSL Architecture, Four Protocols, SSL Message Formats, Transport layer Security

Security at the Network Layer: IPSec- Two modes, Two Security Protocols, Security Association, security policy, Internet Key Exchange

TEXT BOOKS:

1) Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyay, (3e) Mc Graw Hill. (Units 1, 2, 3, 4, 5)

REFERENCE BOOKS:

1) Cryptography and Network Security, William Stallings, (6e) Pearson.
2) Network Security and Cryptography, Bernard Meneges, Cengage Learning.
2) Everyday Cryptography, Keith M.Martin, Oxford.

(Program Elective-III)

MACHINE LEARNING & DEEP LEARNING

IV Year - I Semester **Course Code: 18CS7T03**

Lecture: 2 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 1 **External Marks: 70**

COURSE OBJECTIVES:

1) To introduce students to the basic concepts and techniques of Machine Learning and deep learning.
2) To develop skills of using recent deep learning software for solving practical problems.
3) To gain experience of doing independent study and research.

COURSE OUTCOMES:

1) Understand the basic concepts of concept learning
2) Understand the concepts of evaluating the hypothesis
3) Understand the concept behind neural networks for learning non-linear functions.
4) Develop a deep neural network for image classification
5) Develop a deep network for sequence data analysis

SYLLABUS

UNIT-I

Introduction: Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.

Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.

UNIT-II

Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms.

Features: Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting.

UNIT-III

Artificial Neural Networks: Introduction, Neural Network representation, Perceptrons, multi-layer perceptron, Feed forward neural network, Training Neural Network: Risk minimization, loss function, regularization, model selection, and optimization, Back propagation with case study.

UNIT-IV

Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolution Neural Network.

UNIT-V

Recurrent Neural Network, Auto encoders Introduction to Deep Learning Tools: Tensor Flow, keras.

TEXT BOOKS:

1) Tom M. Mitchell, “Machine Learning” , India Edition 2013, McGraw Hill Education (Unit 1, 2, 3)
2) Huan Liu and Hiroshi Motoda, “Feature Selection For Knowledge Discovery And Datamining” ,Springer Science + Business Media, LLC 1998. (Unit 2)
3) Cha Zhanga and YunqianMa , “Ensemble Machine Learning Methods and Applications”, Springer Science + Business Media, LLC 2012 (Unit 2)
4) Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016. (Unit 4)

REFERENCES:

1. Deep Learning with python by Francois Chollet, Manning Publications.
2. Hands-on Machine Learning with Scikit-learn and TensorFlow by AurelienGeron, O'Reilly Media,2017
3. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.

Program Elective-III

SOFT COMPUTING

IV Year - I Semester **Course Code: 18CS7T04**

Lecture: 2 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 1 **External Marks: 70**

COURSE OBJECTIVES:

1) Soft computing refers to principle components like fuzzy logic, probabilistic computing, evolutionary computing and genetic algorithm, which have their roots in Artificial Intelligence.
2) Healthy integration of all these techniques has resulted in extending the capabilities of the technologies to more effective and efficient problem solving methodologies.

COURSE OUTCOMES:

1) Understand soft computing Vs hard computing
2) Interpret fuzzy systems
3) Apply Adaptive Resonance Theory
4) Analyze and Apply genetic Algorithms
5) Explain fundamentals of differential evolution.

SYLLABUS

UNIT-I

Introduction: What is Soft Computing? Importance of Soft Computing, Properties of Soft Computing methods, Difference between Hard and Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.

UNIT-II

Fuzzy Set Theory: Fuzzy Versus Crisp, Crisp Sets, Fuzzy Sets, Crisp Relations, Fuzzy Relations (Text Book 1)

Fuzzy Systems: Crisp Logic, Predicate Logic, Fuzzy Logic, Fuzzy Rule Based Systems, Defuzzification Methods.

UNIT-III

Adaptive Resonance Theory: Introduction, ART1: Architecture of ART1, Special features fo ART1 Models,ART1 Algorithm, Illustration, ART2: Architecture of ART2, ART2 Algorithm, Illustration, Applications: Character Recognition using ART1, Classification of Soil.

UNIT-IV

Genetic Algorithm: Introduction, Biological Background, Traditional Optimization and Search Techniques, Genetic Algorithm and Search Space, Genetic Algorithm vs. Traditional Algorithms, Basic Terminologies in Genetic Algorithm, Simple GA, General Genetic Algorithm, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Constraints in Genetic Algorithm, Problem Solving Using Genetic Algorithm, Advantages and Limitations of Genetic Algorithm .

UNIT-V

Differential Evolution Algorithm: Differential Evolution – Process Flow and Operators, Selection of DE Control Parameters, Schemes of Differential Evolution, Numerical Illustration of DE Algorithm for a Simple Function Optimization, Applications of Differential Evolution.

TEXT BOOKS:

1. S.Rajasekaran, G.A. Vijayalakshmi Pai, Neural Networks, fuzzy logic, and genetic algorithms - Genetic Algorithm, PHI Learning Private Limited- 2010. (Unit 2, 3,4).

2. S.N.Sivanandam, S.N.Deepa Wiley India , Principles of SOFT COMPUTING, Second Edition 2011.(Unit 1, 5)

REFERENCES:

1. Timothy J. Ross, "Fuzzy Logic with Engineering Applications" Wiley India.

2. SimanHaykin,"NeuralNetowrks"Prentice Hall of India. 3. Kumar Satish, "Neural Networks" Tata Mc Graw Hill.

(Program Elective-III)

DATA ANALYTICS

IV Year - I Semester **Course Code: 18CS7T05**

Lecture: 2 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 1 **External Marks: 70**

COURSE OBJECTIVES:

1. To understand Data Analytics lifecycle and Business Challenges.
2. To understand Analytical Techniques
3. To understand various tools and technologies to handle big data

COURSE OUTCOMES:

1. Understand big data and data analytics life cycle.
2. Explore various supervised learning methods.
3. Explore various unsupervised learning methods.
4. Understand and apply ARIMA model on time series data.
5. Learn various technology and tools in big data analytics.

SYLLABUS

UNIT-I

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

Data Analytics Life Cycle: Data Analytics life cycle Overview, Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize, Case Study.

UNIT-II

Supervised Learning: Decision Trees – Overview of Decision Trees, The General Algorithm, Decision Tree Algorithms, Evaluating a Decision Tree. **Naive Bayes:** Baye’s Theorem, Naïve Baye’s Classifier, Diagnostics of Classifiers.

Regression –Linear Regression, Logistic Regression.

UNIT-III

Unsupervised Learning: Association Rule Mining–Overview, Apriori Algorithm, Evaluation of Candidate Rules, Applications of Association Rules.

Cluster Analysis –Overview of Clustering, k-means

UNIT IV

Time Series Analysis: Overview of Time Series Analysis, ARIMA Model

Text Analysis: Text Analysis Steps, Example, Collecting Raw Data, Representing Text, TFIDF, Categorizing Documents by Topics, Determining Sentiments, Gaining Insights.

UNIT-V

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

In-DataBase Analytics: SQL Essentials, In-Database Text Analysis, Advanced SQL.

TEXT BOOKS:

1. David Dietrich, Barry Hiller, "Data Science and Big Data Analytics", EMC education services, Wiley publications, 2012.

REFERENCE BOOKS:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analytics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O‟ Reilly, 2011.
3. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

(Program Elective-IV)

EMBEDDED SYSTEMS

IV Year - I Semester **Course Code: 18CS7T06**

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1) Technology capabilities and limitations of the hardware, software components
2) Methods to evaluate design tradeoffs between different technology choices.
3) Design Methodologies.

COURSE OUTCOMES:

1) Program an embedded system
2) Design, implement and test an embedded system.
3) Identify the unique characteristics of real-time systems
4) Explain the general structure of a real-time system
5) Define the unique design problems and challenges of real-time systems.

SYLLABUS

UNIT-I

Introduction to Embedded systems: What is an embedded system Vs. General Computing system, history, classification, major application areas, Purpose of embedded systems, Core of embedded system, Characteristics and Quality Attributes of Embedded Systems, Application Specific and Domain specific embedded systems-Examples?

UNIT-II

Factors to be considered in selecting a controller, 8051 architecture, RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

UNIT-III

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

UNIT-IV

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

UNIT-V

Simulators, Emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

TEXT BOOK:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

REFERENCE BOOKS:

1. Ayala &Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
2. Embedded Systems, Rajkamal, TMH, 2009.
3. Embedded Software Primer, David Simon, and Pearson.
4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

(Program Elective-IV)

SOFTWARE TESTING METHODOLOGIES

IV Year - I Semester **Course Code: 18CS7T07**

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1) To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2) To Understand different levels of Testing
3) Apply Black Box and White Box Testing Techniques
4) To learn how to plan a test project, design test cases and data, conduct testing operations, and generate a test report.
5) To understand software test automation problems and solutions.

COURSE OUTCOMES:

1) Have an ability to apply software testing knowledge and engineering methods.
2) Ability to identify the needs of software test automation, and define a test tool to support test automation.
3) Understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.
4) Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.
5) Apply techniques and skills to use modern software testing tools to support software testing projects.

SYLLABUS

UNIT-I

Software Testing: Introduction, Evolution, Dichotomies, Goals & Typical Objectives of Testing, Model for testing, Software Testing Principles, **Software Testing Terminology and Methodology:** Software Testing Terminology, Errors, Defects, Failures, Root Causes and Effects, Software Testing Life Cycle, Software Testing Methodology.

UNIT-II

Verification and Validation: Verification & Validation Activities, Categories of Test Techniques: Dynamic Testing,

Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing,

White-Box Testing: Need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing

UNIT-III

Experience Based Testing Techniques: Error Guessing, Exploratory Testing, Checklist- based Testing

Static Testing: Inspections, Structured Walkthroughs, Technical reviews, Benefits of Static Testing, Static Vs Dynamic Testing.

Levels of Testing: Unit testing, Integration Testing,. Function testing, System testing and Acceptance testing.

Regression testing: Progressive Vs Regressive testing, Objectives of regression testing, Regression testing techniques

UNIT-IV

Test Management: Test Organization, Test Planning, Test Design and Test case specifications, Structure of a Testing Group, Reasons for the growth of a Test suite, Test suite Minimization, Test suite prioritization, Types of test case prioritization, prioritization techniques, Measuring the effectiveness of a prioritized test suite.

Debugging: Debugging process, Debugging Techniques, Correcting Bugs, Debuggers

UNIT-V

Automation and Testing Tools: Need for automation, Testing Tool Considerations, Test Tool Classification, Benefits and Risks of Test automation, Special Considerations for Test execution and Test Management Tools, Principles for tool selection, Testing tools- success factors, Guidelines for automated testing, overview of some commercial testing tools.

TEXT BOOKS:

1. Software testing techniques - Baris Beizer, International Thomson computer press, second edition. (Unit 1)
2. Software Testing, Principles and Practices, Naresh Chauhan, Oxford Publishers(Unit 2,3,4,5)

REFERENCES

1. Effective Methods for Software testing, Willian E Perry, 3ed, Wiley
2. Software Testing, Principles, techniques and Tools, M G Limaye, TMH

(Program Elective-IV)

SOFTWARE PROJECT MANAGEMENT

IV Year - I Semester **Course Code: 18CS7T08**

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1) To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2) To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
3) To understand successful software projects that support organization's strategic goals

COURSE OUTCOMES:

1) Understand the basic concepts and issues of software project management
2) Gain knowledge on effective planning and estimation of software projects.
3) Understand the importance of Risk Management in software Projects.
4) Select and employ mechanisms for tracking the software projects
5) Understand Process and Product Quality metrics

SYLLABUS

UNIT-I

Introduction: Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure.

UNIT-II

Project Approach: Software Lifecycle models, Lifecycle phases

Effort estimation: Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation

UNIT-III

Activity Planning: Activity Identification Approaches, Network planning models, Critical path analysis.

Risk Management: Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

UNIT-IV

Project Monitoring & Control, Resource Allocation: Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

Managing People &Organizing Teams: Oldham-Hackman Job characteristics model, Influence of culture

UNIT-V

Software Quality: Planning Quality, Defining Quality - ISO 9126, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality, Quality plan of ACIC project

TEXT BOOKS:

1. Software Project Management in practice, Pankaj Jalote, Pearson. (Units 1, 2, 3, 4, 5)
2. Software Project Management, Walker Royce: Pearson Education (Units 4, 5)

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA McGraw-Hill
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Quality, Ben-Menachem ,Marliss

BIG DATA & HADOOP LAB

IV Year - I Semester **Course Code: 18CS7L20**

Lecture: 0 Practical: 4 **Internal Marks: 40**

Credits: 2 Tutorial: 0 **External Marks: 60**

COURSE OUTCOMES:

1) Preparing for data summarization, query and analysis.
2) Applying data modeling techniques to large data sets.
3) Creating applications for Big data Analytics.
4) Building a complete business data analytic solution.

LIST OF LAB EXPERIMENTS

Week 1, 2:

1. Implement the following Data structures in Java

   a)Linked Lists b) Stacks c) Queues d) Set e) Map

Week 3, 4:

2. (i) Perform setting up and Installing Hadoop in its three operating modes:

   - Standalone,
   - Pseudo distributed,
   - Fully distributed
   - (ii)Use web based tools to monitor your Hadoop setup.

Week 5:

3. Implement the following file management tasks in Hadoop:

   - Adding files and directories
   - Retrieving files
   - Deleting files
   - Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Week 6:

4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Week 7:

5. Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

Week 8:

6. Implement Matrix Multiplication with Hadoop Map Reduce

Week 9, 10:

7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Week 11, 12:

8. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

MINI PROJECT/INTERNSHIP

IV Year - I Semester **Course Code: 18CS7L21**

Lecture: 0 Practical: 4 **Internal Marks: 100**

Credits: 2 Tutorial: 0 **External Marks:**

- The students are expected to take up an internship program with prior approval from the Department committee after III Year II Semester during the summer break which will be evaluated in the IV Year I Semester. The Internship program shall be for duration of 4 to 6 Weeks.
- The student shall submit a letter of Successful completion of the internship from the organization and present the work carried out to the evaluation committee.
- If the student was unable to take up in the internship program he/she has to take up a project work and will be evaluated in this semester by the Department Internal Evaluation Committee
- Continues evaluation will be done for 40 Marks and final evaluation will be done for 60 Marks

IV YEAR SEMESTER-II SYLLABUS

Program Elective-V

CLOUD COMPUTING

IV Year - II Semester **Course Code: 18CS8T01**

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1) Explain the technology and principles involved in building a cloud environment
2) Apply Map-Reduce concept to applications.
3) To implement Virtualization
4) Contrast various programming models used in cloud computing
5) Choose appropriate cloud model for a given application.

COURSE OUTCOMES:

1) Explain and characterize different cloud deployment models and service models
2) Understand different cloud programming platforms and tools\
3) Illustrate Virtualization for Data-Center Automation.
4) Identify the security issues in cloud computing
5) Understand various basic concepts related to cloud computing technologies

SYLLABUS

UNIT-I

Introduction and Evolution of Computing Paradigms: Overview of Existing Hosting Platforms, Cluster Computing, Grid Computing, Utility Computing, Autonomic Computing, Green Computing, Cloud Computing, history and evolution, practical applications of cloud computing for various industries, IoT, economics and benefits of cloud computing, spot markets, pricing models, Supercomputing-on-demand.

UNIT-II

Cloud Issues and Challenges: Cloud computing issues and challenges like Security, Elasticity, Resource management and Scheduling, QoS (Quality of Service) and Resource Allocation, Cost Management, Big Data, Pre-reservation and Cloud bursting.

Cloud Computing Architecture: Cloud Architecture model, Types of Clouds: Public Private & Hybrid Clouds, Cloud based services: Iaas, PaaS and SaaS.

UNIT-III

Data Center: Classic Data Center, Virtualized Data Center (Compute, Storage, Networking and Application), Business Continuity in VDC.

Virtualization: Virtualization, Advantages and disadvantages of Virtualization, Types of Virtualization: Resource Virtualization i.e. Server, Storage and Network virtualization, Migration of processes, VMware vCloud – IaaS

UNIT-IV

Cloud based Data Storage: Introduction No-SQL databases, Map-Reduce framework for Simplified data processing on Large clusters using Hadoop, Design of data applications based on Map Reduce in Apache Hadoop, Task Partitioning, Data partitioning, Data Synchronization, Distributed File system, Data Replication , Shared access to weakly consistent to data stores

UNIT-V

Classification of Cloud Implementations: Amazon Web Services, The Elastic Compute Cloud (EC2), The Simple Storage Service (S3), The Simple Queuing Services (SQS), Google AppEngine - PaaS, Windows Azure, Aneka, Hadoop, Microsoft Dynamics CRM, A Comparison of Cloud Computing Platforms.

TEXT BOOKS:

1. Raj Kumar Buyya, James Broberg, AndrezeiM.Goscinski, Cloud Computing: Principles and paradigms, MIT Press (2011). (Units 1,2)
2. Cloud Computing: A practical Approach Anthony Velte, Toby Velte and Robert Elsenpeter by Tata McGrawHill (2009). (Unit 5)
3. Michael Miller, Cloud Computing, Que Publishing (2008).(Unit 3,4)

REFERENCES:

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH
2. Judith Hurwitz, Robin Bllor, Marcia Kaufman, F Halper, Cloud Computing for dummies (2009).
3. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier
4. Hwang, Kai, Jack Dongarra, and Geoffrey C. Fox. Distributed and cloud computing: from parallel processing to the internet of things. Morgan Kaufmann, 2013.

Program Elective-V

MOBILE COMPUTING

IV Year - II Semester **Course Code: 18CS8T02**

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1) To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
2) To understand the typical mobile networking infrastructure through a popular GSM protocol.
3) To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer.
4) To understand the database issues in mobile environments & data delivery models.
5) To understand the ad hoc networks and related concepts.

COURSE OUTCOMES:

1) Develop new mobile applications.
2) Identify solutions to the technical issues in the mobile communication paradigm.
3) Understand the ad hoc network applications and/or algorithms/protocols.
4) Understand & develop any existing or new protocol related to mobile environment.
5) Understand the platforms and protocols used in mobile environment

SYLLABUS

UNIT–I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices. GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

UNIT–II

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

UNIT–III

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT –IV

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks. Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT-V

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.(Units 1,2,3)
2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772(Units 4,5)

REFERENCES:

1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, McGraw Hill.
2. UWE Hansmann, LotherMerk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

(Program Elective-V)

IMAGE PROCESSING

IV Year - II Semester **Course Code: 18CS8T03**

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1) To comprehend the relation between human visual system and machine perception and processing of digital images.
2) To provide a detailed approach towards image processing applications like enhancement, segmentation, and compression.

COURSE OUTCOMES:

1) Explore the limitations of the computational methods on digital images.
2) Understand the spatial and frequency domain image transforms on enhancement and restoration of images.
3) Elaborate understanding on image enhancement techniques.
4) Understand Morphological Image Processing techniques
5) Define the need for compression and evaluate the basic compression algorithms.

SYLLABUS

UNIT-I

Digital Image Fundamentals & Image Transforms: Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels. Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT-II

Image Enhancement (Spatial Domain): Introduction, Image Enhancement in Spatial Domain, Enhancement through Point Processing, Types of Point Processing, Histogram Manipulation, Linear and Non – Linear Gray Level Transformation, Local or Neighborhood criterion, Median Filter, Spatial Domain High-Pass Filtering. Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT-III

Image Restoration: Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT-IV

Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, thresholding, Region Oriented Segmentation.

Morphological Image Processing: Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, Hit or Miss Transformation.

UNIT-V

Image Compression: Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Huffman and Arithmetic Coding, Error Free Compression, Lossy Compression, Lossy and Lossless Predictive Coding, Transform Based Compression, JPEG 2000 Standards.

TEXT BOOKS:

1. Digital Image Processing - Rafael C. Gonzalez, Richard E. Woods, 3rd Edition, Pearson, 2008 (Units 1, 2, 3)
2. Digital Image Processing- S Jayaraman, S Esakkirajan, T Veerakumar- MC GRAW HILL 2010(Units 3, 4, 5)

REFERENCE BOOKS:

1. Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools - ScotteUmbaugh, 2nd Ed, CRC Press, 2011
2. Digital Image Processing using MATLAB – Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, 2nd Edition, MC GRAW HILL EDUCATION, 2010.
3. Digital Image Processing and Computer Vision – Somka, Hlavac, Boyle- Cengage Learning (Indian edition) 2008.
4. Introductory Computer Vision Imaging Techniques and Solutions- Adrian low, 2008, 2 nd Edition.

(Program Elective-VI)

ADHOC AND SENSOR NETWORKS

IV Year - II Semester **Course Code: 18CS8T04**

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1. Understanding of wireless adhoc and sensor networks.
2. Enable to recognize the wide range of applicability of these networks
3. Provide them with an understanding of the major design issues including topics such as protocol mechanisms and resource constraints.

COURSE OUTCOMES:

1) Understand the Fundamental Concepts and applications of ad hoc and wireless sensor network
2) Describe the MAC protocol issues of ad hoc networks.
3) Describe routing protocols for ad hoc wireless networks with respect to TCP design issues.
4) Explain the concepts of network architecture and MAC layer protocol for WSN
5) Discuss the WSN routing issues by considering QoS measurements.

SYLLABUS

UNIT-I

Introduction to Ad Hoc Networks: Characteristics of MANETs, Applications of MANETs and challenges of MANETs - Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms, Other routing algorithms.

UNIT-II

Data Transmission: Broadcast storm problem, Broadcasting, Multicasting and Geocasting - TCP over Ad Hoc: TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT-III

Basics of Wireless Sensors and Applications: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

UNIT-IV

Data Retrieval in Sensor Networks: Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, **Sensor Networks and mobile robots -Security:** Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

UNIT-V

Sensor Network Platforms and Tools: Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms - Operating System: TinyOS - Imperative Language: nesC, **Dataflow style language:** TinyGALS, Node-Level Simulators, ns-2 and its sensor network extension, TOSSIM

TEXT BOOKS:

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P.Aggarwal, World Scientific Publications, March 2006, ISBN – 981-256-681-3 (Units 1,2,3)
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)(Units 4, 5)

REFERENCE BOOKS:

1.Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2nd edition, 2011.

2.Feng Zhao and LeonidesGuibas, "Wireless Sensor Networks", Elsevier Publication

3.Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005 (soft copy available)

4.Kazem Sohraby, Daniel Minoli, &TaiebZnati, "Wireless Sensor Networks Technology, Protocols, and Applications", John Wiley, 2007. (soft copy available)

5.Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.(soft copy available)

(Program Elective-VI)

HUMAN COMPUTER INTERACTION

IV Year - II Semester	Course Code: 18CS8T05
Lecture: 3 Practical: 0	Internal Marks: 30
Credits: 3 Tutorial: 0	External Marks: 70

COURSE OBJECTIVES:

1. Explain the capabilities of both humans and computers from the viewpoint of human information processing.
2. To make the student think constructively and analytically about how to design and evaluate interactive technologies.

COURSE OUTCOMES:

1) Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms.
2) Apply an interactive design process and universal design principles to designing HCI systems.
3) Understand the importance of Natural Languages in computing interactions.
4) Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems.
5) Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.

SYLLABUS

UNIT-I

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession.

Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues.

UNIT-II

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays

UNIT-III

Command and Natural Languages: Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large

UNIT-IV

Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences Balancing Function and Fashion: Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color

UNIT-V

User Documentation and Online Help: Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process.

TEXT BOOKS:

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson (Units 1, 2, 3, 4)
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech. (Unit 5)

REFERENCE BOOKS:

1. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley.

(Program Elective-VI)

ARTIFICIAL INTELLIGENCE & NEURAL NETWORKS

IV Year - II Semester **Course Code: 18CS8T06**

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

Students will try to learn:

1. To conceptualize the basic ideas and techniques underlying the design of intelligent systems.
2. To make students understand advanced representation formalism and search techniques.
3. Develop the skills to gain a basic understanding of artificial neural networks

COURSE OUTCOMES:

1. Develop a basic understanding of AI building blocks presented in intelligent agents.
2. Choose an appropriate problem solving method and knowledge representation technique for searching.
3. Represent & Reasons logical Agents.
4. Use neural networks for practical applications such as Pattern Recognition problem
5. Apply appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications

SYLLABUS

UNIT-I

Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

UNIT–II

Searching: Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Greedy best first search, A* search Game Playing: Adversial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search.

UNIT–III

Knowledge Representation & Reasons logical Agents, Knowledge – Based Agents, the Wumpus world, logic, propositional logic, Resolution patterns in proposional logic, Resolution, Forward & Backward Chaining. First order logic. Inference in first order logic, propositional Vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution.

UNIT–IV

Characteristics of Neural Networks, Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws, Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units.

UNIT–V

Feed forward Neural Networks:

Introduction, Analysis of pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of pattern storage Networks. Analysis of Pattern Mapping Networks.

Feedback Neural Networks: Introduction, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks

TEXT BOOKS :

1. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/ Pearson Education. (Units 1, 2)
2. Artificial Neural Networks B. Yagna Narayana, PHI (Units 3, 4, 5)

REFERENCES :

1. Artificial Intelligence , 2nd Edition, E.Rich and K.Knight (TMH).
2. Artificial Intelligence and Expert Systems – Patterson PHI.
3. Expert Systems: Principles and Programming- Fourth Edn, Giarrantana/ Riley, Thomson.
4. PROLOG Programming for Artificial Intelligence. Ivan Bratka- Third Edition – Pearson Education.
5.Neural Networks Simon Haykin PHI
6. Artificial Intelligence, 3rd Edition, Patrick Henry Winston., Pearson Edition.

MAJOR PROJECT

IV Year - II Semester **Course Code: 18CS8L22**

Lecture: 0 Practical: 6 **Internal Marks: 40**

Credits: 8 Tutorial: 0 **External Marks: 60**

- **The Student takes up a project work along with the four subjects mentioned. The project shall have two evaluations**
    - Internal Evaluation – Continues Internal evaluation will be done for 40 Marks
    - External Evaluation – Will be performed by an External Examiner for 60 Marks

Open Elective Syllabus

Employability Skills: Competitive Coding

Open Elective I

Lecture: 2 Practical: 2 Internal Marks: 30

Credits: 3 Tutorial: 0 External Marks: 70

COURSE OBJECTIVES:

2) To give an understanding of programming concepts.
3) To get the student prepared for various coding contests conducted as part of their recruitment process

COURSE OUTCOMES:

1) Understand and Apply the fundamental concepts of various programming Languages.
2) Apply Recursion to various problems.
3) Assess the Efficiency of Algorithms.
4) Apply Search and Sort Techniques.
5) Apply Data Structures for Problem Solving.

SYLLABUS

Unit I:
What is Competitive Programming, Various Programming Contests?
Programming Techniques: Programming Language Features, Input & Output, Working with Numbers, Control Structures, Understanding and displaying various patterns, shortening the code: Examples

Unit II:
Recursive Algorithms: Generating Subsets, Generating Permutations, Backtracking, Bit Manipulations, Representing Sets. Examples

Unit III:
Algorithm Efficiency: Time complexity, Rules for calculating Time complexity, calculating Time complexity, Estimating Efficiency of Algorithms: Examples

Unit IV:
Sorting and Searching: Implementing the sorting Algorithms, Solving problems by sorting-Scheduling events, Tasks and Deadlines, Implementing Binary Search, Finding the optimal solutions: Examples

Unit V:
Data Structures: Applying Linear and Non Linear Data Structures: Stacks, Queues, Linked Lists, Priority Queues, Hash Tables, Trees, Graphs - Examples

Programming Languages to Discuss: C , C++, Java

Students must solve at least 100 problems in CodeChef / HackerRank, etc. The category may be under Easy / Medium. Problems to be solved in C,/C++/ Java or Python.
A minimum of 10 problems shall be solved per week in either CodeChef / HarckerRank, etc. The contests hosted in CodeChef / HackerRank, etc,. may be taken as day to day assessment of laboratory which will be evaluated for 30 Marks The work will be carried out in the laboratory slot allotted as well as at the home. Final Evaluation shall be done internally for 70 Marks.

TEXTBOOKS & REFERENCES

1) Halim, Steven and Halim, Felix, Competitive Programming 3, 2013.
2) Ahmed Shamsul Arefin, Art of Programming Contest, ACMSolver, Second Edition, 2012
3) Programming Challenges: The Programming Contest Training Manual By Steven S Skiena, Miguel A. Revilla
4) Guide to Competitive Programming: Learning and Improving Algorithms Through Contests By Antti Laaksonen
5) Cracking the Coding Interview 6th Edition. GAYLE LAAKMANN MCDOWELL
6) C++ Complete Reference- 4th Edition- Herbert Schildt- TMH
7) Introduction to Programming Languages - Arvind Kumar Bansal.

COMPUTER NETWORKS

Open Elective II

Lecture: 3 Practical: 0 Internal Marks: 30

Credits: 3 Tutorial: 0 External Marks: 70

COURSE OBJECTIVES:

1) Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
2) Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3) Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4) Learn various IEEE standards for medium access.
5) Recognize different network connecting devices.

COURSE OUTCOMES:

1) Independently enumerate the layers of the OSI model and TCP/IP
2) Identify the different types of network topologies and protocols.
3) Compare and contrast methods to identify Errors and correct them.
4) Differentiate between various network routing algorithms.
5) Understand WWW and HTTP Architectures.

SYLLABUS

UNIT–I

Introduction: OSI overview, TCP/IP and other networks models, Examples of Networks: Arpanet, Internet, Network Topologies Wide Area Networks(WAN), Local Area Networks(LAN), Metropolitan Area Networks(MAN).

UNIT–II

Physical Layer and overview of PL Switching: Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

UNIT–III

Data link layer: Design issues, **Framing**: fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, services provided to Network.

Elementary Data Link Layer protocols: Simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. **Sliding window protocol**: One bit, Go-back N, Selective Repetitive protocol, Stop and wait protocol.

UNIT – IV

Random Access: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: Frequency Division Multiple Access(FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access(CDMA).

Network layer: Shortest Path, Distance Vector Routing Algorithm, Hierarchal routing algorithm

UNIT–V

Application layer (WWW and HTTP): WWWARCHITECTURE: Client (Browser),Server, Uniform Resource Locator, Resource Record, HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Request Message Format, HTTP Response Message Format.

TEXT BOOKS:

1. Data Communications and Networks – Behrouz A. Forouzan. Third Edition TMH. Units 1,2,4)
2. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education (Units 1, 3, 5)

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

SOFTWARE PROJECT MANAGEMENT

Open Elective

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1) To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
2) To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
3) To understand successful software projects that support organization's strategic goals

COURSE OUTCOMES:

1) Understand the basic concepts and issues of software project management
2) Gain knowledge on effective planning and estimation of software projects.
3) Understand the importance of Risk Management in software Projects.
4) Select and employ mechanisms for tracking the software projects
5) Understand Process and Product Quality metrics

SYLLABUS

UNIT-I

Introduction: Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure.

UNIT-II

Project Approach: Software Lifecycle models, Lifecycle phases

Effort estimation: Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation

UNIT-III

Activity Planning: Activity Identification Approaches, Network planning models, Critical path analysis.

Risk Management: Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

UNIT-IV

Project Monitoring & Control, Resource Allocation: Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

Managing People &Organizing Teams: Oldham-Hackman Job characteristics model, Influence of culture

UNIT-V

Software Quality: Planning Quality, Defining Quality - ISO 9126, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality, Quality plan of ACIC project

TEXT BOOKS:

1. Software Project Management in practice, Pankaj Jalote, Pearson. (Units 1, 2, 3, 4, 5)
2. Software Project Management, Walker Royce: Pearson Education (Units 4, 5)

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes & Mike Cotterell, TATA McGraw-Hill
2. Software Project Management, Joel Henry, Pearson Education.
3. Software Quality, Ben-Menachem ,Marliss

COMPUTER ORGANIZATION & ARCHITECTURE

Open Elective III

Lecture: 2	Practical: 0	Internal Marks: 30
Credits: 2	Tutorial: 0	External Marks: 70

PREREQUISITES: -DLD

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

1. Understand the architecture of a modern computer with its various processing units.

2. Understand RTL, micro operations, instruction cycle

3. Understand the features of hardwired and micro programmed control units.

4. Analyze the memory hierarchy system and performance improvement by cache memory.

5. Analyze the communication methods of I/O devices and standard I/O interfaces.

SYLLABUS:

UNIT I:

Basic Structure of Computers: Computer Types, Functional unit, Basic Operational concepts, Bus structures, Data Representation: Data types, Complements, Fixed Point Representation. Floating – Point Representation. Other Binary Codes, Error Detection codes. Performance, The history of computer development.

UNIT II:

Register Transfer Language And Micro Operations: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shiftmicro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Register, Computer instructions, Timing and control, Instruction cycle, Memory – Reference Instructions. Input –Output and Interrupt.

UNIT III :

Central Processing Unit: Stack Organization**,** Instruction formats, Addressing modes, Data Transfer and Manipulation Instructions, Program control Instructions.

Control Unit: Control Memory, Hard wired control, Micro programmed control and Micro Instruction Format, Address Sequencing, Design of Control Unit.

UNIT IV:

Memory Organization:

Memory Hierarchy, Primary Memory, Introduction to Secondary Memory, Associative Memory, Cache Memory, virtual Memory, Memory Management hardware.

UNIT V:

PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access, IOP, Serial Communication.

TEXT BOOKS

1.M.Morris Mano, ―Computer Systems Architecture, Pearson Education publishers, 3rd edition.
2. Carl Hamacher, ZvonkoVranesic, SafwatZaky, ―Computer Organization, TMH publications, 5th edition, 2002.

REFERENCE BOOKS:

1. William Stallings, ―Computer Organization and Architecture, Pearson/PHI publishers, 6th edition, 2004.
2. Andrew S. Tanenbaum, ―Structured Computer Organization, Pearson/PHI publishers, 4th edition, 2005.
3.John D Carpinelli, ―Computer Systems Organization and Architecture‖, Pearson Education, 1st edition, 2001

INTERNET OF THINGS

Open Elective IV

Lecture: 3 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1) Understand the architecture of Internet of Things and connected world.
2) Explore on use of various hardware, communication and sensing technologies to build IoT applications.
3) Develop the real time IoT applications to make smart world.
4) Understand challenges and future trends in IoT.

COURSE OUTCOMES:

1) Design and Deployment of IoT.
2) Design and comparing M2M with IoT
3) Understand Platform design and modeling of IoT
4) Apply IoT in different devices using Python
5) Implement IoT and cloud platforms

SYLLABUS

UNIT-I

INTRODUCTION TO INTERNET OF THINGS (IoT): Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT Enabling Technologies, IoT levels and deployment, domains Specific IoTs.

UNIT-II

IoT AND M2M : Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

UNIT-III

IoT PLATFORMS DESIGN METHODOLOGY: IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model. Logical design using Python: Installing Python, Python data types and data Structures, control flow, functions, modules, packages, file handling.

IoT Physical Devices and Endpoints: Introduction to Raspberry Pi interfaces (Serial, SPI, I2C), programming Raspberry PI with Python, other IoT devices.

UNIT-IV

IoT Protocols: Messaging Protocols- MQ Telemetry Transport (MQTT), Constrained Application Protocol (CoAP) Transport Protocols-Light Fidelity(Li-Fi), Bluetooth Low Energy(BLE)

IoT Protocols: Addressing and Identification: Internet Protocol Version 4(IPV4), Internet Protocol Version 6(IPV6), Uniform Resource Identifier (URI)

UNIT-V

IoT Physical Servers And Cloud Offerings: Introduction to cloud storage models and communication APIs, WAMP –AutoBahn for IoT, Xively cloud for IoT, case studies illustrating IoT design –home automation, smart cities, smart environment.

TEXT BOOKS:

1) ArshdeepBahga, Vijay Madisetti, “Internet of Things: A Hands-on-Approach”, VPT, 1stEdition, 2014.(Units 1,2,3,5)
2) Matt Richardson, Shawn Wallace, “Getting Started with Raspberry Pi”, O’Reilly (SPD), 3rdEdition, 2014.(Unit 3)
3) Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram “ Internet of Things” Wiley(Unit 4)

REFERENCE BOOKS:

1) Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw HillHigher Education
2) Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, John Wiley andSons2014.

OPERATING SYSTEMS

Open Elective V

Lecture: 3	Practical: 0	Internal Marks: 30
Credits: 3	Tutorial: 0	External Marks: 70

PREREQUISITES: -

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:

1.Understand the functionalities of an operating system and Evaluate different CPU scheduling algorithms.

2. Apply synchronization to cooperating processes and handle the deadlocks

3. Learn various management techniques for efficient utilization of system memory.

4. Understand and analyze theory andimplementation offiles and Evaluate different disk scheduling algorithms.

5. Analyze the functionalities in various operating systems.

SYLLABUS:

UNIT I

Introduction to Operating System Concept: Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

Process Management – Process concept, the process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Inter process Communication, Scheduling-Basic Concepts, Scheduling Criteria, and Scheduling Algorithms.

UNIT-II:

Concurrency: Process Synchronization, The Critical-Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples

Principles of deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

UNIT-III:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation

Virtual Memory Management:

Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

UNIT-IV:

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management

Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

UNIT V:

Linux System: Components of LINUX, Inter process Communication, Synchronization, Interrupt, Exception and System Call.

Android Software Platform: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management

TEXT BOOKS:

1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.

2. Operating Systems – Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.

3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016 .

REFERENCES:

1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.

2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education", 1996.

3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata Mc Graw-Hill Education, 2007.

(PROGRAM ELECTIVE –IV)

MULTIMEDIA AND APPLICATION DEVELOPMENT

IV Year – I Semester **Course Code: 18IT7T08**

Lecture: 2 Practical: 0 **Internal Marks: 30**

Credits: 3 Tutorial: 1 **External Marks: 70**

COURSE OBJECTIVES:

1. To learn and understand technical aspect of Multimedia Systems.
2. To understand the standards available for different audio.
3. To Design and develop various Multimedia Systems applicable in real time.
4. To learn various multimedia authoring systems.
5. To understand various networking aspects used for multimedia applications.
6. To develop multimedia application and analyze the performance.

COURSE OUTCOMES:

1. Developed understanding of technical aspect of Multimedia Systems.
2. Understand various file formats for audio, video and text media and video andtext applications.
3. Develop various Multimedia Systems applicable in real time.
4. Design interactive multimedia software.
5. Apply various networking protocols for multimedia applications.

SYLLABUS

UNIT-I

Fundamental concepts in Text and Image: Multimedia and hypermedia, World Wide Web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT-II

Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio. Action Script I : ActionScript Features, Object-Oriented ActionScript, Data types and Type Checking, Classes, Authoring an ActionScript Class.

UNIT-III

Action Script II: Inheritance, Authoring an ActionScript 2.0 Subclass, Interfaces, Packages, Exceptions. Application Development: An OOP Application Frame work, Using Components with ActionScript MovieClip Subclasses.

UNIT-IV

Multimedia data compression: Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, and Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

UNIT-V

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques. Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand(MOD).

TEXT BOOKS:

1. Fudamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI/Pearson Education. (1, 2, 3,

REFERENCE BOOKS:

1. Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY.
2. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
3. Macromedia Flash MX Professional 2004 Unleashed, Pearson.
4. Multimedia and communications Technology , Steve Heath, Elsevier(FocalPress).

BIG DATA &HADOOP LAB

IV Year – I Semester **Course Code: 18IT7L20**

Lecture: 0 Practical: 4 **Internal Marks: 40**

Credits: 2 Tutorial: 0 **External Marks: 60**

COURSE OBJECTIVES:

1. Optimize business decisions and create competitive advantage with Big Data analytics
2. Introducing Java concepts required for developing map reduce programs
3. Derive business benefit from unstructured data
4. Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
5. To introduce programming tools PIG & HIVE in Hadoop echo system.

COURSE OUTCOMES:-

1. Preparing for data summarization, query, and analysis
2. Applying data modeling techniques to large data sets
3. Creating applications for Big Data analytics.
4. Building a complete business data analytic solution.

LIST OF EXPERIMENTS

Week 1,2:

1. Implement the following Data structures in Java

a)Linked Lists b) Stacks c) Queues d) Set e) Map

Week 3, 4:

2. (i)Perform setting up and Installing Hadoop in its three operating modes: standalone, Pseudo distributed, Fully distributed

(ii)Use web based tools to monitor your Hadoop setup.

Week 5:

3. Implement the following file management tasks in Hadoop:

i) Adding files and directories

ii) Retrieving files

iii) Deleting files

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Week 6:

1. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Week 7:

5. Write a Map Reduce program that mines weather data.

Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

Week 8:

6. Implement Matrix Multiplication with Hadoop Map Reduce

Week 9,10:

7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Week 11, 12:

8. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

MINI PROJECT/INTERNSHIP

IV Year - I Semester **Course Code: 18CS7L21**

Lecture: 0 Practical: 4 Internal Marks: 100

Credits: 2 Tutorial: 0 External Marks:

- The students are expected to take up an internship program with prior approval from the Department committee after III Year II Semester during the summer break which will be evaluated in the IV Year I Semester. The Internship program shall be for duration of 4 to 6 Weeks.
- The student shall submit a letter of Successful completion of the internship from the organization and present the work carried out to the evaluation committee.
- If the student was unable to take up in the internship program he/she has to take up a project work and will be evaluated in this semester by the Department Internal Evaluation Committee
- Continues Internal evaluation shall be done for 40 Marks and final evaluation shall be done for 60 Marks.

(PROGRAM ELECTIVE V)

MACHINE LEARNING & DEEP LEARNING

IV Year – II Semester **Course Code: 18IT8T02**

Lecture:3 Practical:0 **Internal Marks: 30**

Credits:3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

1) To introduce students to the basic concepts and techniques of Machine Learning and deep learning.
2) To develop skills of using recent deep learning software for solving practical problems.
3) To gain experience of doing independent study and research.

COURSE OUTCOMES:

1) Understand the basic concepts of concept learning
2) Understand the concepts of evaluating the hypothesis
3) Understand the concept behind neural networks for learning non-linear functions.
4) Develop a deep neural network for image classification
5) Develop a deep network for sequence data analysis

SYLLABUS

UNIT-I

Introduction: Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.

Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.

UNIT-II

Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms.

Features: Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting.

UNIT-III

Artificial Neural Networks: Introduction, Neural Network representation, Perceptrons, multi-layer perceptron, Feed forward neural network, Training Neural Network: Risk minimization, loss function, regularization, model selection, and optimization, Back propagation with case study.

UNIT-IV

Deep Learning: Deep Feed Forward network, regularizations, training deep models, dropouts, Convolution Neural Network.

UNIT-V

Recurrent Neural Network, Auto encoders Introduction to Deep Learning Tools: Tensor Flow, keras.

TEXT BOOKS:

1) Tom M. Mitchell, “Machine Learning” , India Edition 2013, McGraw Hill Education (Unit 1, 2, 3)
2) Huan Liu and Hiroshi Motoda, “Feature Selection For Knowledge Discovery And Datamining” ,Springer Science + Business Media, LLC 1998. (Unit 2)
3) Cha Zhanga and YunqianMa , “Ensemble Machine Learning Methods and Applications”, Springer Science + Business Media, LLC 2012 (Unit 2)
4) Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016. (Unit 4)

REFERENCES:

1. Deep Learning with python by Francois Chollet, Manning Publications.
2. Hands-on Machine Learning with Scikit-learn and TensorFlow by AurelienGeron, O'Reilly Media,2017
3. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.

(PROGRAM ELECTIVE –V)
PRINCIPLES OF TCP/IP

IV Year – II Semester	**Course Code: 18IT8T03**
Lecture:3 Practical:0	**Internal Marks: 30**
Credits:3 Tutorial: 0	**External Marks: 70**

COURSE OBJECTIVES:

1. Understand the IP addressing schemes.
2. Understand the fundamentals of network design and implementation
3. Understand the design and implementation of TCP/IP networks
4. Understand on network management issues
5. Learn to design and implement network applications.

COURSE OUTCOMES:

1. Design and implement TCP/IP networks.
2. Explain network management issues.
3. Design and implement network applications. Develop data structures for basicprotocol functions of TCP/IP.
4. Apply the members in the respective structures.

SYLLABUS

UNIT–I

Network Models: Layered Tasks, The OSI Model, Layers in OSI Model, TCP/IP Protocol suite, Addressing. Connecting devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two Layer Switches, Routers, Three Layer Switches, Gateway, and Backbone Networks.

UNIT–II

Internetworking Concepts: Principles of Internetworking, Connectionless Interconnection, Application Level Interconnection, Network Level Interconnection, Properties of the Internet, Internet Architecture, Interconnection through IP Routers TCP, UDP; IP: TCP Services, TCP Features, Segment, A TCP Connection, Flow Control, Error Control, Congestion Control, Process to Process Communication, User Datagram, Checksum, UDP Operation, IP Datagram, Fragmentation, Options, IP Addressing: Classful Addressing, IPV6.

UNIT-III

Congestion and Quality of Service: Data Traffic, Congestion, Congestion Control, Congestion Control in TCP, Congestion Control in Frame Relay, Source Based Congestion Avoidance, DEC Bit Scheme, Quality of Service, Techniques to Improve QOS: Scheduling, Traffic Shaping, Admission Control, Resource Reservation, Integrated Services and Differentiated Services.

UNIT-IV

Stream Control Transmission Protocol: SCTP Services, SCTP Features, PacketFormat,Flow Control, Error Control, Congestion Control. Mobile Network Layer: Entities and Terminology, IP Packet Delivery, Agents, Addressing, Agent Discovery, Registration, Tunneling and Encapsulating, Inefficiency in Mobile IP.

UNIT-V

Mobile Transport Layer : Classical TCP Improvements, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast/Recovery, Transmission, Timeout Freezing, Selective Retransmission, Transaction Oriented TCP.

TEXT BOOKS:

1. Behrouz A Forouzan, “TCP/IP Protocol Suite”, TMH, 3rd Edition(Units- 1,2,3,4,5)

REFERENCES:

1. Mahbub Hasan & Raj Jain, ” High performance TCP/IP Networking”, PHI -2005
2. Douglas. E.Comer, “Internetworking with TCP/IP “, Volume I PHI
3. Larry L. Perterson and Bruce S. Davie , “Computer Networks- A Systems Approach”, 2011, Morgan Kaufmann
4. Jochen Schiiler, “Mobile Communications”, Pearson, 2nd Edition.

(PROGRAM ELECTIVE –VI)
REAL TIME SYSTEMS

IV Year – II Semester **Course Code: 18IT8T04**

Lecture:3 Practical:0 **Internal Marks: 30**

Credits:3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

2) Technology capabilities and limitations of the hardware, software components
3) Methods to evaluate design tradeoffs between different technology choices.
4) Design Methodologies.

COURSE OUTCOMES:

1) Program an embedded system
2) Design, implement and test an embedded system.
3) Identify the unique characteristics of real-time systems
4) Explain the general structure of a real-time system
5) Define the unique design problems and challenges of real-time systems.

SYLLABUS

UNIT-I

Introduction to Embedded systems: What is an embedded system Vs. General Computing system, history, classification, major application areas, Purpose of embedded systems, Core of embedded system, Characteristics and Quality Attributes of Embedded Systems, Application Specific and Domain specific embedded systems-Examples?

UNIT-II

Factors to be considered in selecting a controller, 8051 architecture, RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

UNIT-III

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

UNIT-IV

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

UNIT-V

Simulators, Emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

TEXT BOOK:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

REFERENCE BOOKS:

1. Ayala &Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
2. Embedded Systems, Rajkamal, TMH, 2009.
3. Embedded Software Primer, David Simon, and Pearson.
4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

(PROGRAM ELECTIVE –VI)

INTRODUCTION TO MAIN FRAME SYSTEMS

IV Year – II Semester **Course Code: 18IT8T06**

Lecture:3 Practical:0 **Internal Marks: 30**

Credits:3 Tutorial: 0 **External Marks: 70**

COURSE OBJECTIVES:

Students undergoing this course are expected

1. To understand the importance of Legacy System.
2. To role of Mainframes in infrastructure of a medium to large IT organization.
3. To understand the different components of Mainframe Technology.

COURSE OUTCOMES:

Students undergoing this course are able to:

1. Discuss Mainframes hardware systems. Operating systems and its functions.
2. Describe Z-operating system and Virtual Storage.
3. Explain the need of Job Control Language Statement and Procedures on JoB Processing
4. Develop applications using COBOL Programming
5. Expand Mainframe applications using COBOL-DB2 programming.

SYLLABUS

UNIT-I

Hardware configurations, Processors, Multiprocessing, Input/ Output Devices, Applications, Characteristic Features of Mainframe Operating System, Mainframe Configurations, Roles in the Mainframe World, Typical Mainframe Workloads. Operating systems on mainframes, Batch processing vs. online processing - mainframe operating system concepts

UNIT-II

z/Os and other Mainframe operating systems, What is z/OS, Overview of z/OS facilities, virtual Storage and other Mainframe Concepts, Workload management, MVS Concepts ,Address Spaces ,Addressing Mode and Residence Mode , Multiple Virtual Storage, Multiprogramming, MVS/370
Address Space Organizations, How data sets are stored?, Catalogs, Data Set Organization, VSAM Basics
Introduction to Job Control language - Job processing - structure of JCL statements - Various statements in JCL - JOB statement - EXEC statement - DD statement - JCL procedures and IBM utility programs

UNIT-III

Introduction – History, evolution and Features, COBOL program Structure, steps in executing COBOL. Language Fundamentals – Divisions, sections, paragraphs, sections, sentences and statements, character set, literals, words, figurative constants, rules for forming user defined words, COBOL coding sheet. Data division – Data names, level numbers, PIC and VALUE clause, REDEIFNES, RENAMES and USAGE clause. Procedure Division – Input / Output verbs, INITIALIZE verb, data movement verbs, arithmetic verbs, sequence control verbs

UNIT-IV

File processing – Field, physical / logical records, file, file organization (sequential, indexed and relative) and access mode, FILE-CONTROL paragraph, FILE SECTION, file operations. File handling verbs – OPEN, READ, WRITE, REWRITE, CLOSE. Table processing – Definition, declaration, accessing elements, subscript and index, SET statement, SEARCH verb, SEARCH ALL verb, comparison.

UNIT-V

Overview of DB2 and Mainframe Application Development GuidelinesIntroduction to DB2,Major components of DB2- System Service component, LockingService component, Database Service component, DB2 Application program preparation and Execution,DB2 Objects-Databases, Tablespaces, Stored tables, Indexes, Indexspaces, Storage groups, View, Bufferpool. DB2 SQL programming – Types of SQL statements, DCL, DDL, DML, Advanced SQL topics, UPDATE operations, Aggregate functions

TEXT BOOKS:

1. IBM Mainframe Handbook – Alexis Leon. (For Unit 1, 3,4,5) 2. M.K. Roy and D.Ghosh Dastidar,
2. “Cobol Programming”, Tata McGraw Hill, Second Edition. (Unit 3)

3.Doug Lowe, "MVS JCL ", Mike Murach and Associates Inc, 2nd edition, 1994.(Unit 2)

REFERENCE BOOKS:

1. COBOL - Language Reference, Ver 3, Release 2, IBM Redbook.

2. COBOL - Programming Guide, Ver 3, Release 2, IBM Redbook

.3. Gary DeWard Brown, JCL Programming Bible (with z/OS) fifth edition, Wiley IndiaDream Tech, 2002.

4. M.K. Roy and D. Ghosh Dastidar, "Cobol Programming", Tata McGraw Hill, NewYork, 1973.

5. Newcomer and Lawrence, Programming with Structured COBOL, McGraw Hill Books, NewYork, 1973.

	L	T	P	C
MCA III SEMESTER	3	0	0	3

20MC3T01 MACHINE LEARNING WITH PYTHON

Course Objectives:

From the course the student will learn

- To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
- Explore supervised and unsupervised learning paradigms of machine learning.
- To explore Deep learning technique and various feature extraction strategies.

Course Outcomes :

- Illustrate and comprehend the basics of Machine Learning with Python
- Demonstrate the algorithms of Supervised Learning and be able to differentiate linear and logistic regressions
- Demonstrate the algorithms of Unsupervised Learning and be able to understand the clustering algorithms
- Evaluate the concepts of binning, pipeline Interfaces with examples
- Apply the sentiment analysis for various case studies

UNIT I:

Introduction to Machine Learning with Python: Introduction to Machine Learning, basic terminology, Types of Machine Learning and Applications, Using Python for Machine Learning: Installing Python and packages from the Python Package Index, Introduction to NumPy, SciPy, matplotlib and scikit-learn, Tiny application of Machine Learning.

UNIT II:

Supervised Learning: Types of Supervised Learning, Supervised Machine Learning Algorithms: k- Nearest Neighbors, Regression Models, Naïve Bayes Classifiers, Decision Trees, Ensembles of Decision Trees, Kernelized Support Vector Machines, Uncertainty Estimates from Classifiers.

UNIT III:

Building good training datasets: Dealing with missing data, Handling categorical data, partitioning a data set into separate training and test datasets, bringing features onto the same scale, selecting meaningful features, assessing feature importance with random forests. **Compressing data via dimensionality reduction**: Unsupervised dimensionality reduction via PCA, Supervised data compression via linear discriminant analysis

UNIT IV:

Learning best Practices for Model Evaluation and Hyper parameter tuning: streamlining workflows with pipelines, using k-fold cross validation to assess model performance, debugging algorithms with learning and validation curves, fine tuning machine learning models via grid search, looking at different performance evaluation metrics. **Combining different models for Ensemble learning:** learning with ensembles, combining classifiers via majority vote, bagging-building an ensemble of classifiers from bootstrap samples, leveraging weak learners via adaptive boosting

UNITV:

Working with Text Data (Data Visualization): Types of Data Represented as Strings, Example Application: Sentiment Analysis of Movie Reviews, Representing Text Data as a Bag of Words, Stop Words, Rescaling the Data with tf-idf, Investigating Model Coefficients, Approaching a Machine Learning Problem, Testing Production Systems, Ranking, Recommender Systems and Other kinds of Learning.

Reference Books:

1) Introduction to Machine Learning with Python: A Guide for Data Scientists, Andreas C. Muller & Sarah Guido, Orielly Publications, 2019.
2) Python Machine Learning, Sebastian Raschka & Vahid Mirjalili, 3rd Edition, 2019.
3) Machine Learning using Python, Manaranjan Pradhan, U Dinesh Kumar, Wiley, 1stEdition, 2019
4) Machine Learning, Tom M. Mitchell, Mc Graw-Hill Publication,2017
5) Building Machine Learning Systems with Python, Luis Pedro Coelho, Willi Richert, 2nd Edition, 2015.
6) Programming and Problem Solving with Python, Ashok Namdev Kamthane, Amit Ashok Kamthane, TMH, 2019.

MCA III SEMESTER

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20MC3T02 Big Data Analytics

COURSE OBJECTIVES:

1) Optimize business decisions and create competitive advantage with Big Data analytics
2) Introducing Java concepts required for developing map reduce programs
3) Derive business benefit from unstructured data
4) Imparting the architectural concepts of Hadoop and introducing map reduce paradigm

COURSE OUTCOMES:

1) Understand methods for data summarization, query, and analysis.
2) Apply data modelling techniques to large data sets
3) Creating applications for Big Data analytics
4) Building a complete business data analytic solution.
5) Understand programming tools PIG & HIVE in Hadoop eco-system.

SYLLABUS

UNIT-I

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

UNIT-II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Name node, Data node, Secondary Name node, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

UNIT-III

Writing Map Reduce Programs: A Weather Dataset, Understanding Hadoop API for Map Reduce Framework (Old and New), Basic programs of Hadoop Map Reduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner.

UNIT-IV

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

UNIT-V

Pig: Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

REFERENCE BOOKS:

1) Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2) Hadoop: The Definitive Guide by Tom White, 3 Edition, O'reilly
3) Hadoop in Action by Chuck Lam, MANNING Publ.9
4) Hadoop for Dummies by Dirk deRoos, Paul C. Zikopoulos, Roman B.Melnyk, Bruce Brown, Rafael
Coss
5) Hadoop in Practice by Alex Holmes, MANNING Publ.
5) Hadoop Map Reduce Cookbook, Srinath Perera, Thilina Gunarathne

MCA III SEMESTER

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20MC3T07 **CYBER SECURITY**

Course Objectives:

- To familiarize various types of cyber-attacks and cyber-crimes
- To give an overview of the cyber laws
- To study the defensive techniques against these attacks.

Course Outcomes:

- Understand the basics of cyber security
- Understand types of cybercrimes and cyber laws
- Understand Cyber crime concepts with respect to Mobile Devices
- Understand Organizational implications on cyber security
- Understand privacy policy mechanisms

UNIT I:

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT II:

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing

UNIT III:

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, OrganizationalMeasuresforHandlingMobile,OrganizationalSecurityPoliciesandMeasuresin Mobile Computing Era, Laptops

UNIT IV:

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations. **Cybercrime and Cyber terrorism:** Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT V:

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

Reference Books:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.
3. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
4. Introduction to Cyber Security, Chwan- Hwa (john) Wu, J. David Irwin, CRC Press T&F Group

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MCA III SEMESTER	0	0	3	1.5

20MC3T08 **ADVANCED DATABASES**

Course Objectives: To introduce basic concepts of different types of databases like distributed databases, object oriented databases and parallel databases and to give basics of designing different types of databases.

Course Outcomes: By the completion of the course, the students should be able to:

- Outline the concepts of relational database system.
- Understand the basic concepts in distributed databases.
- Analyze the advanced concepts of distributed databases.
- Understand the design issues in parallel databases.
- Apply the concepts of object oriented databases to solve real world problems.

UNIT – I:

RELATIONAL MODEL ISSUES: ER model, Normalization, Query processing, query optimization, transaction processing, Database tuning, comparison of different databases.

UNIT – II:

DISTRIBUTED DBMS: Concepts and Design, Introduction, Overview of Networking, Functions and architectures of a DDBMS, Distributed Relational Database Design, and Transparencies in a DDBMS.

UNIT – III:

DISTRIBUTED DBMS: Advanced concepts- Distributed Transaction Management, Distributed Concurrency control, Distributed Deadlock Management, Distributed Database Recovery, Distributed query optimization.

UNIT – IV:

Introduction to Parallel databases, architectures for parallel databases, Parallel Query Evaluation – data partitioning and parallelizing sequential operator evaluation code, Parallelizing individual operations, and parallel Query optimization.

UNIT – V:

Object Database System: Abstract data types, Objects identity and reference types, Inheritance, Database design for ORDBMS, ODMG (Object Data Management Group) data model, ODL (Object Definition Language), OQL (Object Query Language).

References:

1. Thomas Connolly, Carolyn Begg ―Database Systems, A Practical Approach to Design, Implementation and Management‖,Tthird edition, Pearson Education
2. Raghuramakrishnan and Johannes Gehrke: ―Database Management Systems‖, 3rdEdition, TMH, 2006.

MCA III SEMESTER

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20MC3L09 **MACHINE LEARNING WITH PYTHON LAB**

Course Objectives:

- Make use of Datasets in implementing the machine learning algorithms
- Implementthemachinelearningconceptsandalgorithmsinanysuitablelanguageofchoice.
- Design Python programs for various Learning algorithms.

Course Outcomes (COs): At the end of the course, student will be able to

- Implement procedures for the machine learning algorithms
- Design Python programs for various Learning algorithms
- Apply appropriate data sets to the Machine Learning algorithms
- Identify and apply Machine Learning algorithms to solve real world problems

Note: Consider any dataset from kaggle

Experiment 1:

Installation of Python and its packages (Pandas, NumPy, SciPy, matplotlib and scikit-learn) (Install Anaconda, Jypyter Notebook, and Programs covering basic concepts in Python Programming)

Basics of Python:

Write a program to read two numbers from user and display the result using bitwise & , |and
^ operators on the numbers.
Write a program to calculate the sum of numbers from 1 to 20 which are not divisible by 2, 3 or 5. Write a program to find the maximum of two numbers using functions.
Implement slicing operation on strings and lists.

Experiment 2:

Implement python program to load structured data onto Data Frame and perform exploratory data analysis
Implement python program for data preparation activities such as filtering, grouping, ordering and joining of datasets.

Experiment 3:

Implement Python program to prepare plots such as bar plot, histogram, distribution plot, box plot, scatter plot.

Experiment 4:

Implement Simple Linear regression algorithm in Python

Implement Gradient Descent algorithm for the above linear regression model

Experiment 5:

Implement Multiple linear regression algorithm using Python.

Experiment 6:

Implement Python Program to build logistic regression and decision tree models using the Python package stats model and sklearn APIs.

Experiment 7:

Implement Python Program to perform the activities such as

- splitting the data set into training and validation datasets
- building model using Python package on training dataset and test on the validation dataset

Experiment 8:

Write a Python program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.

Experiment 9:

Implement Support vector Machine algorithm on any data set

Experiment 10:

Write a program to implement the naïve Bayesian classifier for a sample training dataset store dasa.csv file. Compute the accuracy of the classifier, considering few test datasets.

Experiment 11:

Write a Python program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.

Experiment 12:

Assuming a set of documents that need to be classified, use the naive Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision and recall for your data set.

Experiment 13:

Implement PCA on any Image dataset for dimensionality reduction and classification of images into different classes

Experiment 14:

Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

MCA III SEMESTER

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20MC3L10 **Big Data Analytics LAB**

COURSE OBJECTIVE:

To understand data summarization, and modelling techniques and create applications for Big Data Analytics

COURSE OUTCOMES:

1) Preparing for data summarization, query and analysis.
2) Applying data modelling techniques to large data sets.
3) Creating applications for Big data Analytics.
4) Building a complete business data analytic solution.

LIST OF LAB EXPERIMENTS

Week 1, 2:

1. Implement the following Data structures in Java
   a) Linked Lists b) Stacks c) Queues d) Set e) Map

Week 3, 4:

2. (i) Perform setting up and Installing Hadoop in its three operating modes:
   - Standalone,
   - Pseudo distributed,
   - Fully distributed

(ii)Use web based tools to monitor your Hadoop setup.

Week 5:

3. Implement the following file management tasks in Hadoop:
   - Adding files and directories
   - Retrieving files
   - Deleting files
   - Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Week 6:

4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Week 7:

5. Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi-structured and record-oriented.

Week 8:

6. Implement Matrix Multiplication with Hadoop Map Reduce

Week 9, 10:

7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Week 11, 12:

8. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

MCA IV SEMESTER	L	T	P	C
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20MC4T01 **DIGITAL MARKETING**

Course Objectives:

Digital marketing aims at being SMART (Specific, Measurable, Achievable, Relevant and Time Related) so that people can withstand against competitors.

Course Outcomes

- Explain about web pages with basic HTML5, DHTML tags using CSS and XML, the overview of W3CDOM.
- Discuss the key elements of a digital Java Scripts.
- Apply search engine optimization techniques to a website.
- Illustrate how the effectiveness of a digital marketing campaign can be measured
- Demonstrate advanced practical skills in common digital marketing tools such as SEO, SEM, Social media and Blogs

UNIT I:

HTML: Introduction, HTML5, Audio Elements, Video Elements, Organizing Elements. **Scripting Documents:** Dynamic Document content, Document properties, Legacy DOM, Document Collections, Overview of the W3C DOM, Traversing a Document, Finding Elements in a Document, Modifying a Document, Adding Content to a Document Example

UNIT II:

Cascading Style Sheets and Dynamic HTML: Overview of CSS, CSS for DHTML Scripting inline Styles, Scripting computed styles, Scripting CSS Classes, Scripting Style Sheets, **Java Script and XML:** Obtaining XML Documents, Manipulating XML with the DOM API, Transforming XML with XSLT querying XML with X path, Serializing XML, Example, XML and Web services.

UNIT III:

Search Engine Optimization (SEO): Searching Engine Marketing, Search Engine Optimization, Measuring SEO Success, Mapping with SEO Journey, **Search**

Advertising: Online Advertising Payment Models, Search Advertising (Desktop & Mobile Devices), Planning & Executing a search Advertising Camping, Strategic Implications of Advertising on the search Network.

UNIT IV:

Search Media Marketing: What is Social Media? Social Media Marketing, Social Media Marketing Strategy, Adopting Social Media in Organizations: Internal Learning, Paid-Owned-Earned Media, Social CRM,

Mobile Marketing:

Mobile Internet in India, What is Mobile Marketing? Email Marketing Strategy, Forms of Mobile Marketing, Mobile Advertising, M-Commerce.

UNIT V:

E-Mail Marketing: E-Mail Marketing in India, What is E-Mail Marketing? E-Mail Marketing Strategy, Executing E-Mail Marketing,

Internet Marketing:

Internet Marketing Strategy, Content Marketing, Content Marketing in India.

Reference Books:

1. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns, Ian Dodson, Wiley,2016
2. Programming the World Wide Web, Robet W Sebesta, Pearson, 8thedition,2015
3. Fundamentals of Digital Marketing, Second Edition, Pearson Paperback,2019
4. Internet Marketing- A Practical approach in the India Context by Moutusy Maity, Oxford
5. Java Script: The Definite Guide David Flanagan, O' Reilly Publisher

MCA IV SEMESTER

L	T	P	C
3	0	0	3

20MC4T02 **HUMAN RESOURCE MANAGEMENT**

Course Objectives:

- Contribute to the development, implementation, and evaluation of employee recruitment, selection, and retention plans and processes.
- Administer and contribute to the design and evaluation of the performance management program.
- Facilitate and support effective employee and labor relations in both non-union and union environments.

Course Outcomes:

- Explain the importance of human resources and their effective management in organizations
- Demonstrate a basic understanding of different tools used in forecasting and planning, human resource need.
- Describe the meanings of terminology and tools used in managing employees effectively
- Make use of Record governmental regulations affecting employees and employers
- Analyze the key issues related to administering the human elements such as motivation, compensation, appraisal, career planning, diversity, ethics, and training

UNIT I:

HRM: Significance - Definition and Functions – evolution of HRM- Principles - Ethical Aspects of HRM- - HR policies, Strategies to increase firm performance - Role and position of HR department – aligning HR strategy with organizational strategy - HRM at global perspective -challenges – cross- cultural problems – emerging trends in HRM.

UNIT II:

Investment perspectives of HRM: HR Planning – Demand and Supply forecasting - Recruitment and Selection- Sources of recruitment - Tests and Interview Techniques - Training and Development – Methods and techniques – Training evaluation - retention - Job Analysis – job description and specifications - Management development - HRD concepts.

UNIT III:

Wage and Salary Administration: Concept- Wage Structure- Wage and Salary Policies- Legal Frame Work- Determinants of Payment of Wages- Wage Differentials - Job design and Evaluation- Incentive Payment Systems. Welfare management: Nature and concepts – statutory and non-statutory welfare measures – incentive mechanisms.

UNIT IV:

Performance Evaluation: Importance – Methods – Traditional and Modern methods – Latest trends in performance appraisal - Career Development and Counseling- Compensation, Concepts and Principles- Influencing Factors- Current Trends in Compensation- Methods of Payments - compensation mechanisms at international level.

UNIT V:

Managing Industrial Relations: Trade Unions - Employee Participation Schemes- Collective Bargaining–Grievances and disputes resolution mechanisms – Safety at work – nature and importance – work hazards – safety mechanisms - Managing work place stress.

References:

1) K Aswathappa: “Human Resource and Personnel Management”, Tata McGraw Hill, New Delhi, 2013
2) N. Sambasiva Rao and Dr. Nirmal Kumar: “Human Resource Management and Industrial Relations”, Himalaya Publishing House, Mumbai
3) Mathis, Jackson, Tripathy:“Human Resource Management: Asouth-Asin Perspective”, Cengage Learning, New Delhi, 2013
4) Subba Rao P: “Personnel and Human Resource Management-Text and Cases”, Himalaya Publications, Mumbai, 2013.
5) Madhurima Lall, Sakina Qasim Zasidi: “Human Resource Management”, Excel Books, New Delhi, 2010

MCA IV SEMESTER	**L**	**T**	**P**	**C**
	3	0	0	3

20MC4T03 **AD-HOC AND SENSOR NETWORKS**

Course Objectives:

- From the course the student will earn
- Architect sensor networks for various application setups
- Devise appropriate data dissemination protocols and model links cost
- Understanding of the fundamental concepts of wireless sensor networks and has a basic knowledge of the various protocols at various layers
- Evaluate the performance of sensor networks and identify bottlenecks

Course Outcomes:

- Evaluate the principles and characteristics of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks
- Determine the principles and characteristics of wireless sensor networks
- Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc sensor networks
- Illustrate the various sensor network Platforms, tools and applications
- Demonstrate the issues and challenges in security provisioning and also familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs

UNIT I:

Introduction : Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, Radio propagation Mechanisms ,Characteristics of the Wireless channel mobile ad hoc networks (MANETs), **Wireless Sensor Networks (WSNs):** concepts and architectures, Applications of Ad Hoc and Sensor Networks, Design Challenges in Ad hoc and Sensor Networks.

UNIT II:

MAC Protocols For Ad Hoc Wireless Networks: Issues in designing a MAC Protocol, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols, Contention based protocols, Contention based protocols with Reservation Mechanisms, Contention based protocols with Scheduling Mechanisms, Multi channel MAC - IEEE 802.11.

UNIT III:

Routing Protocols And Transport Layer In Ad Hoc Wireless Networks: Routing Protocol: Issues in designing a routing protocol for Ad hoc networks, Classification, proactive routing, reactive routing(on- demand), hybrid routing, Transport Layer protocol for Ad hoc networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer solutions –TCP over Ad hoc wireless, Network Security, Security in Ad Hoc Wireless Networks, Network Security Requirements.

UNIT IV:

Wireless Sensor Networks (WSNS) and Mac Protocols: Single node architecture - hardware and software components of a sensor node, **WSN Network architecture:** typical network architectures, data relaying and aggregation strategies, **MAC layer protocols:** self-organizing, Hybrid TDMA/FDMA and CSMA based MAC -IEEE802.15.4.

UNIT V:

WSN Routing, Localization & Qos: Issues in WSN routing, OLSR, Localization, Indoor and Sensor Network Localization, absolute and relative localization, triangulation, QOS in WSN, Energy Efficient Design, Synchronization.

Reference Books:

1) "Ad Hoc Wireless Networks: Architectures and Protocols ", C. Siva Ram Murthy, and B. S. Manoj, Pearson Education,2008
2) “Wireless Adhoc and Sensor Networks”, Labiod. H, Wiley, 1stedition-2008
3) “Wireless ad -hoc and sensor Networks: theory and applications”, Li, X, Cambridge University Press, fifthedition-2008.
4) “Ad Hoc & Sensor Networks: Theory and Applications”, 2nd edition, Carlos De Morais Cordeiro, Dharma Prakash Agrawal, World Scientific Publishing Company, 2011
5) "Wireless Sensor Networks", Feng Zhao and Leonides Guibas, Elsevier Publication 2nd edition- 2004
6) “Protocols and Architectures for Wireless Sensor Networks”, Holger Karl and Andreas Willig, Wiley, 2005 (soft copy available)

MCA IV Semester

L	T	P	C
3	0	0	3

20MC4T04 **BLOCK CHAIN TECHNOLOGIES**

Course Objectives:

- Impart strong technical understanding of Blockchain technologies
- Develop familiarity of current technologies, tools, and implementation strategies
- Introduce application areas, current practices, and research activity

Course Outcomes (Cos): At the end of the course, student will be able to

- Demonstrate the foundation of the Blockchain technology and understand the processes in payment and funding.
- Identify the risks involved in building Blockchain applications.
- Review of legal implications using smart contracts.
- Choose the present landscape of Blockchain implementations and Understand Cryptocurrency markets.
- Examine how to profit from trading cryptocurrencies.

UNIT I:

The consensus problem, Asynchronous Byzantine Agreement, AAP protocol and its analysis, Nakamoto Consensus on permission-less, nameless, peer-to-peer network, Abstract Models for BLOCKCHAIN, GARAY model, RLA Model, Proof of Work (PoW) as random oracle, formal treatment of consistency, liveness and fairness-Proof of Stake (PoS) based Chains, Hybrid models (PoW+PoS).

UNIT II:

Cryptographic basics for cryptocurrency, A short overview of Hashing, signature schemes, encryption schemes and elliptic curve cryptography

UNIT III:

Bitcoin, Wallet, Blocks, Merkley Tree, hardness of mining, transaction verifiability, anonymity, forks, double spending, mathematical analysis of properties of Bitcoin.

UNIT IV:

Ethereum: Ethereum Virtual Machine (EVM), Wallets for Ethereum, Solidity, Smart Contracts, some attacks on smart contracts

UNIT V:

(Trends and Topics): Zero Knowledge proofs and protocols in Block chain, Succinct non interactive argument for Knowledge (SNARK), pairing on Elliptic curves, Zcash.

Reference Books:

1) Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016. (Free download available)
2) Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and crypto currency, IEEE Symposium on security and Privacy, 2015 (article available for free download) {curtain raiser kind of generic article, written by seasoned experts and pioneers}.
3) J.A.Garayet al, The bitcoin backbone protocol - analysis and applications EUROCRYPT 2015 LNCS VOl9057, (VOLII), pp 281-310. (Also available at eprint.iacr.org/2016/1048). (serious beginning of discussions related to formal models for bit coin protocols).
4) R. Passetal, Analysis of Block chain protocol in Asynchronous networks, EUROCRYPT 2017, print.iacr.org/2016/454).A significant progress and consolidation of several principles).

B.TECH I SEMESTER	BSC	L	T	P	C
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20AD1T01 LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

Pre-requisite: Basic knowledge about matrices, differentiation and integration

Course Objective: Objective of the course is to impart

- Basic understanding of mathematical methods to solve simultaneous linear systems
- Understanding of formation and solutions of ordinary differential equations
- Knowing the mathematical methods to solve applications of differential equations

Course Outcomes:

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

CO1: Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations

CO2: Illustrate the methods of computing eigen values and eigen vectors

CO3: Able to analyze the real life situations, formulate the differential equations and then applying the methods

CO4: Determine the solutions of linear differential equations

CO5: Optimize functions of several variables and able to find extreme values of constrained functions

SYLLABUS

UNIT-I: Linear systems of equations:

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence of vectors, Consistency of linear system of equations, System of linear homogeneous equations, Gauss-elimination and Gauss -Jordan methods.

UNIT-II: Eigen values & Eigen vectors:

Eigen values, Eigen vectors, Properties of Eigen values (without proofs), Cayley-Hamilton theorem (without proof), finding inverse and powers of a matrix using C-H theorem, Reduction to diagonal form, reduction of quadratic form to canonical form using orthogonal reduction, nature of quadratic forms.

UNIT-III: Ordinary Differential Equations of first order:

Linear equations, Bernoulli’s equation, Exact differential equations. Equations reducible to exact equations, **Applications:** Orthogonal Trajectories, Newton's Law of cooling, Rate of decay & growth, R-L series circuits.

UNIT-IV: Linear Differential Equations higher order:

Definitions, Complete solution (without proof), Operator D, Rules to find complementary function, Inverse operator, Rules to find the particular integral(nonhomogeneous term of the form e^{ax}, sin(ax+b), cos(ax+b), polynomials in x^m, $e^{ax}V(x)$, any other function), Method of variation of parameters.

UNIT-V: Partial Differentiation:

Functions of two variables, Partial derivatives, Homogeneous functions, Euler's theorem, Total derivative, Jacobian and functional dependence, Taylor's theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL**,** A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH I SEMESTER	**BSC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20AD1T02 APPLIED CHEMISTRY

Pre-requisite: Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the availableresources

Course Objective: Objective of the course is to impart

- Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
- Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
- Explain the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- Recall the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- Outline the basics of green chemistry and molecular switches

Course Outcomes: At the end of the course, student will be able to

CO1: Analyze the different types of composite plastic materials and interpret the mechanism ofconduction in conducting polymers.

CO2: Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning newengineering products and categorize the reasons for corrosion and study methods to control corrosion.

CO3: Synthesize nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystalsand superconductors.

CO4: Design models for energy by different natural sources.
Analyze the principles of different analytical instruments and their applications.

CO5: Obtain the knowledge of green chemistry and molecular machines

SYLLABUS

UNIT-I: Polymer Technology

Polymerisation: Introduction, methods of polymerization (addition and Condensation), Physical and mechanical properties.

Plastics: Compounding, fabrication (compression, injection, blown film and extrusion), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets.

Elastomers: Natural rubber-Drawbacks-vulcanization, preparation, properties and applications (Buna S, thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics – GFRP and Aramid FRP

Conducting polymers: Intrinsic and extrinsic conducting polymers

Biodegradable polymers: preparation and applications

UNIT-II: Electrochemical Cells And Corrosion

Part I: ELECTROCHEMICAL CELLS: Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells (H_2-O_2, CH_3OH-O_2, phosphoric acid and molten carbonate).

Part II: Corrosion: Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, galvanic series, factors influencing rate of corrosion, corrosion control (cathodic protection), Protective coatings (cathodic coatings, anodic coatings, electroplating and electroless plating)

UNIT-III: Material Chemistry

Part I: Non-elemental semiconducting materials: Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling technique) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

Super conductors:-Type –I, Type II-characteristics and applications

Part II: Nano materials: Introduction, sol-gel method, characterization by (Brunauer Emmet Teller[BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]), applications of graphene and fullerenes, carbon nanotubes (types, preparation and applications)

Liquid crystals: Introduction-types-applications.

UNIT-IV: Non-Conventional Energy Sources & Spectroscopy

Part I: NON-CONVENTIONAL ENERGY SOURCES

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, tidal and wave power, ocean thermal energy conversion.

Part II: **SPECTROSCOPY**

UV spectroscopy- Basic principle-Instrumentation-Applications

IR spectroscopy- Basic principle-Instrumentation-Applications

NMR spectroscopy- Basic principle-Instrumentation-Applications

UNIT-V: Advanced Concepts/Topics In Chemistry

Part-I: Green chemistry: Introduction, Principles of green chemistry, Green synthesis- Aquaeous Phase method-Microwave method-Phase transfer catalysis method, R4M4 principles (Econoburette).

PART-II: Molecular switches: characteristics of molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid- base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor.

Text Books:

1. P.C. Jain and M. Jain "Engineering Chemistry", 15/e, Dhanpat Rai & Sons, Delhi,(Latest edition).
2. Shikha Agarwal, "Engineering Chemistry", Cambridge University Press, New Delhi,(2019).
3. S.S. Dara, "A Textbook of Engineering Chemistry", S.Chand & Co, (2010).
4. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai Publicating Co. (Latest edition).

References:

1. K. Sesha Maheshwaramma and Mridula Chugh, "Engineering Chemistry", Pearson India
2. O.G. Palana, "Engineering Chemistry", Tata McGraw Hill Education Private Limited,(2009).
3. CNR Rao and JM Honig (Eds) "Preparation and characterization of materials" Academic press, New York (latest edition)
4. B. S. Murthy, P. Shankar and others, "Textbook of Nanoscience and Nanotechnology",University press (latest edition)

B.TECH I SEMESTER		**HSMC**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

20AD1T03 ENGLISH

Pre-requisite:

Course Objective:

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Course Outcomes: At the end of the course, student will be able to

CO1 understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information

CO2 ask and answer general questions on familiar topics

CO3 employ suitable strategies to master the art of letter writing and email writing

CO4 recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs

CO5 form sentences using proper grammatical structures and correct word forms

SYLLABUS

UNIT-I A Drawer full of happiness (Detailed Study)
Deliverance (Non-detailed Study)

UNIT-II Nehru's letter to his daughter Indira on her birthday(Detailed Study)
Bosom Friend (Non-detailed Study)

UNIT-III Stephen Hawking-Positivity 'Benchmark' (Detailed Study)
Shakespeare's Sister(Non-detailed Study)

UNIT-IV Liking a Tree, Unbowed: Wangari Maathai-biography (Detailed Study)

Telephone Conversation(Non-detailed Study)

UNIT-V Stay Hungry-Stay foolish (Detailed Study)
Still I Rise(Non-detailed Study)

Text Books

1. "Infotech English", Maruthi Publications. (Detailed)
2. "The Individual Society", Pearson Publications.(Non-detailed)

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

B.TECH I SEMESTER	**ESC**	**L**	**T**	**P**	**C**
		1	**0**	**4**	**3**

20AD1L04 COMPUTER ENGIENERING WORKSHOP

Course Objectives:

Skills and knowledge provided by this subject are the following:

- **PC Hardware:** Identification of basic peripherals, Assembling a PC, Installation of system software like MS Windows, device drivers, etc. Troubleshooting of PC Hardware and Software issues.
- **Internet & World Wide Web:** Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber attacks.
- **Productivity Tools:** Understanding and practical approach of professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite office tools.

Course Outcomes:

CO1: Identify, assemble and update the components of a computer

CO2: Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems

CO3: Make use of tools for converting pdf to word and vice versa

CO4: Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex

LIST OF EXERCISES

Task 1: Identification of the peripherals of a computer - Prepare a report containing the block diagram of the computer along with the configuration of each component and its functionality. Describe about various I/O Devices and its usage.

Task 2: Practicing disassembling and assembling components of a PC

Task 3: Installation of Device Drivers, MS Windows, Linux Operating systems and Disk Partitioning, dual boating with Windows and Linux.

Task 4: Introduction to Memory and Storage Devices, I/O Port, Assemblers, Compilers, Interpreters, Linkers and Loaders.

Task 5: Demonstration of Hardware and Software Troubleshooting

Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth Technology, Wireless Technology, Modem, DSL, and Dialup Connection.

Task 7: Surfing the Web using Web Browsers, Awareness of various threats on the Internet and its solutions, Search engines and usage of various search engines, Need of anti-virus, Installation of anti-virus, configuring personal firewall and windows update.

(Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and popup blockers)

Productivity Tools:

Task 8: Basic HTML tags, Introduction to HTML5 and its tags, Introduction to CSS3 and its properties. Preparation of a simple website/ homepage,

Assignment: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

Features to be covered:- Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, etc.,

Task 9: Demonstration and Practice of various features of Microsoft Word

Assignment:

1. Create a project certificate.

2. Creating a news letter

Features to be covered:-Formatting Fonts, Paragraphs, Text effects, Spacing, Borders and Colors, Header and Footer, Date and Time option, tables, Images, Bullets and Numbering, Table of Content, Newspaper columns, Drawing toolbar and Word Art and Mail Merge in word etc.,

Task 10: Demonstration and Practice of various features Microsoft Excel

Assignment: 1. Creating a scheduler

2. Calculating GPA

3. Calculating Total, average of marks in various subjects and ranks of students

based on marks

Features to be covered:Format Cells, Summation, auto fill, Formatting Text, Cell Referencing, Formulae in excel, Charts, Renaming and Inserting worksheets, etc.,

Task 11: Demonstration and Practice of various features Microsoft Power Point

Features to be covered:Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Hyperlinks Tables and Charts, Master Layouts, Types of views, Inserting – Background, textures, Design Templates, etc.,

Task 12: Demonstration and Practice of various features LaTeX – document preparation, presentation (Features covered in Task 9 and Task 11 need to be explored in LaTex)

Task 13: Tools for converting word to pdf and pdf to word

Task 14: Internet of Things (IoT): IoT fundamentals, applications, protocols, communication models, architecture, IoT devices

Reference Books:

1. Computer Fundamentals, Anita Goel, Pearson India Education, 2017

2. PC Hardware Trouble Shooting Made Easy, TMH

3. Introduction to Information Technology, ITL Education Solutions Limited, 2nd Edition, Pearson, 2020

4. Upgrading and Repairing PCs, 18th Edition, Scott Mueller, QUE, Pearson, 2008

5. LaTeX Companion – Leslie Lamport, PHI/Pearson

6. Introducing HTML5, Bruce Lawson, Remy Sharp, 2nd Edition, Pearson, 2012

7. Teach yourself HTML in 24 hours, By Techmedia

8. HTML 5 and CSS 3.0 to the Real World by Alexis Goldstein, Sitepoint publication.

9. Internet of Things, Technologies, Applications, Challenges and Solutions, B K Tripathy, J Anuradha, CRC Press

10. Comdex Information Technology Course Tool Kit, Vikas Gupta, Wiley Dreamtech.

11. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme, CISCO Press, Pearson Education.

12. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N. B. Venkateswarlu, S. Chand Publishers

		L	T	P	C
B.TECH I SEMESTER	**ESC**	**3**	**0**	**0**	**3**

20AD1T05 PROBLEM SOLVING THROUGH C

Pre-requisite:

Course Objective:

- To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C. To learn about the design concepts of arrays, strings, enumerated structure and union types and their usage. To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor. To assimilate about File I/O and significance of functions

Course Outcomes: At the end of the course, student will be able to

CO1: Understand the basic concepts of programming

CO2: Understand and Apply loop construct for a given problem

CO3: Demonstrate the use pointers

CO4: Understand the use of functions and develop modular reusable code

CO5: Understand File I/O operations

SYLLABUS

UNIT-I:

INTRODUCTION TO COMPUTERS: Functional Components of computer, computer software, categories of memory, types of programming languages, Development of algorithms, flow charts, software development process, Computer Numbering system

BASICS OF C PROGRAMMING: Introduction to programming paradigms, Structure of C program, Data Types, C Tokens, Operators: Precedence and Associativity, Expressions Input/output statements, Assignment statements

UNIT-II:

Decision making statements: if, if else, nester if. Multi way decision making statements: else if, Switch statement. **Loop statements**: while, do while, for, Compilation process.

UNIT-III:

Introduction to Arrays: Declaration, Initialization, One dimensional array, Example Programs on one dimensional array, Selection sort, linear and binary search, two dimensional arrays, Matrix Operations, Multi-dimensional Arrays

Strings: Declaration, String operations: length, compare, concatenate, copy, String handling functions.

UNIT-IV:

FUNCTIONS: Introduction to functions: Function prototype, function definition, function call, Built-in functions, Recursion, Storage classes, Passing Arrays & Strings to the functions, Preprocessor directives

POINTERS: Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers, Array of pointers, Parameter passing: Pass by value, Pass by reference, Dynamic Memory Allocation

UNIT-V:

STRUCTURES AND UNIONS: Structure, Nested structures, Pointer and Structures, Array of structures, Example Program using structures and pointers, Self-referential structures, Unions.

FILE PROCESSING: Files, Types of file processing: Sequential access, Random access, Sequential access file, Random access file, Command line arguments

Text Books:

1. Krnighan. B.W and Ritche, D.M, “The C Programming Language”, Second Edition, Pearson Education, 2006
2. ReemaThareja, “Programming in C”, Oxford University Press, Second Edition, 2016.

References:

1. Pradepdey, Manas Ghosh, “Fundamentals of Computing and programming in C”, First Edition, Oxford University Press, 2009.
2. Paul Deitel and Harvey Deitel, “C How to Program”, Seventh Edition, Pearson Publication.
3. E Balagursamy, “Programming in C, Sixth Edition, Tata McGraw Hill.
4. Ajay Mittal, “Programming in C A practical Approach”, Pearson education

B.TECH I SEMESTER	HSMC	L	T	P	C
		0	0	3	1.5

20AD1L06 ENGLISH COMMUNICATION SKILLS LAB

Course Objectives:

- Facilitate effective usage of functional English through role plays
- Focus on vocabulary enhancement
- Foster various nuances of phonetics and accent neutralization

Course Outcomes: At the end of the course, student will be able to

CO1: Acquire basic proficiency in English by learning functional aspects of English language

CO2: Learn the methods of enhancing vocabulary

CO3: Acquaint himself/herself with nuances of Phonetics

LIST OF EXPERIMENTS

1 Greetings and Introductions
2 Requesting Permission & Giving Directions
3 Inviting/Complaining/Congratulating
4 Root Words
5 Phonetics-Sounds and Symbols
6 Pronunciation Rules

References:

1. Strengthen Your Steps, Maruti Publications

2. Interact, Orient Blackswan

3. Word Power Made Easy, Pocket Books

B.TECH I SEMESTER		**BSC**	**L**	**T**	**P**	**C**
			0	**0**	**3**	**1.5**

20AD1L07 APPLIED CHEMISTRY LAB

Pre-requisite: Acquire some experimental skills.

Course Objective: Objective of the course is to impart

- The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations.
- A few instrumental methods of chemical analysis.

Course Outcomes:

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

CO1: The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

LIST OF EXPERIMENTS

1. Determination of HCl using standard Na2CO3 solution.
2. Determination of alkalinity of a sample containing Na2CO3 and NaOH.
3. Determination of Mn+2 using standard oxalic acid solution.
4. Determination of ferrous iron using standard K2Cr2O7 solution.
5. Determination of Cu+2 using standard hypo solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of Fe+3 by a colorimetric method.
8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).
9. Determination of iso-electric point of amino acids using pH-metry method/conductometric method
10. Determination of the concentration of strong acid vs strong base (by conductometric method).
11. Determination of strong acid vs strong base (by potentiometric method).

12 Determination of Mg^{+2} present in an antacid.

13 Determination of $CaCO_3$ present in an egg shell.

14 Estimation of Vitamin C.

15 Determination of phosphoric content in soft drinks.

16 Adsorption of acetic acid by charcoal.

17 Preparation of nylon-6, 6 and Bakelite (demonstration only).

B.TECH I SEMESTER	ESC	L	T	P	C
		0	0	3	1.5

20AD1L08 PROBLEM SOLVING THROUGH C LAB

Course Objectives:

- Apply the principles of C language in problem solving.
- To design flowcharts, algorithms and knowing how to debug programs.
- To design & develop of C programs using arrays, strings pointers &functions.
- To review the file operations, preprocessor commands.

Course Outcomes:

- Demonstrate Knowledge on various concepts of a C language.
- Able to draw flowcharts and write algorithms.
- Able design and development of C problem solving skills.
- Able to design and develop modular programming skills.
- Able to trace and debug a program

Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5inches.
3. Write a C program to display multiple variables.

Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.

2. Write a program in C to display the n terms of harmonic series and their sum. 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6:

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

Exercise 11:

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13:

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc( )function.

Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc( ) function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16:

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name
3. Write a program in C to remove a file from the disk.

B.TECH I SEMESTER	**MC**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**--**

20AD1M09 ENVIRONMENTAL SCIENCE

Course objective:

To understand the importance of Environment and the importance of biodiversity

Course outcomes:

- The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
- The concepts of the ecosystem and its function in the environment.
- 3.The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
- The environmental legislations of India and Social issues and the possible means
- Environmental assessment and the stages involved in EIA.

SYLLABUS

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Introduction- Scope of Environmental Studies- Importance of Environmental Studies- Need for public awareness, Environmental ethics- Contemporary Environmentalists- Environmental Global moves: Stockholm conference, Earth summit

Concept of an ecosystem - Structure of an ecosystem- function of an ecosystem- Food chains, food webs- ecological pyramids- Energy flow in the ecosystem- Ecological succession- Nutrient cycling- 1^oproduction& 2^oproduction- Major ecosystems: Forest ecosystem- Grassland ecosystem, Desert ecosystem- Aquatic ecosystem: pond, Lake Ecosystem- Streams, river ecosystem, Oceans

UNIT-II: NATURAL RESOURCES AND CONSERVATION

Introduction and classification of natural resources-Forest resources**:** Use and over-exploitation- Deforestation-Timber extraction-Mining- Conservation-Water resources**:** Use and over utilization of surface and ground water,- Floods, drought, Dams and associated problems- Water conservation, rain water harvesting, water shed management-Energy resources**:** renewable energy sources –solar-wind-hydro-tidal- Ocean thermal-geo thermal-bio mass-bio gas-bio fuels- Hydrogen.- Non-renewable energy sources-coal-petroleum-natural gas-Nuclear energy

UNIT-III: **BIODIVERSITY AND ITS CONSERVATION**

Definition, classification- Value of biodiversity-Threats to biodiversity: habitat loss, man-wildlife conflicts- Endangered and endemic species of India-Conservation of biodiversity- Biodiversity at national and local levels, Hot-sports of biodiversity

UNIT-IV: ENVIRONMENTAL PROBLEMS

Global warming, Climate change- Acid rain, Ozone depletion- Air pollution- Water pollution- Soil pollution- Noise pollution, Nuclear hazards- Solid Waste Management: Causes, Consequences and Control methods- Solid Waste Management- Population growth and explosion, effects, control measures- Pollution case studies- Role of an individual in prevention of pollution

UNIT-V: ENVIRONMENTALLEGISLATION & MANAGEMENT

Sustainable development- Air (Prevention and Control of Pollution) Act-Drawbacks-Water (Prevention and control of Pollution) Act- Drawbacks- Wildlife Protection Act-Drawbacks- Forest Conservation Act- Drawbacks- Environmental Protection Act-Drawbacks- Environmental Impact Assessment and its significance- Preparation of Environmental Management Plan and Environmental Impact Statement- Ecotourism

TEXT BOOKS:

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age Publications, New Delhi

2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

4. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCES:

1. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.

2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi

3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi

4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Delhi

B.TECH II SEMESTER	**BSC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20AD2T01 TRANSFORM TECHNIQUES

Pre-requisite: Linear Algebra and Differential Equations

Course Objective: Objective of the course is to impart

- Learning the techniques of Laplace transforms to solve ordinary differential equations
- knowledge of Fourier series & Fourier transforms for piecewise continuous functions
- knowledge of solving boundary valued problems

Course Outcomes: At the end of the course, student will be able to

CO1: Able to analyze a class of integrals in terms of beta and gamma functions

CO2: Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing

CO3: Analyze the general periodic functions in the form of an infinite convergent sine and cosine series

CO4: Illustrate the methods to solve the boundary value problems

CO5: Determine a solution of a discrete system using Z- transforms

SYLLABUS

UNIT-I: Special functions:

Beta function, Properties & problems, Gamma function, properties & problems, Relation between Beta and Gamma functions, Evaluation of improper integrals.

UNIT-II: Laplace Transforms (all properties without proofs):

Definition, Transforms of elementary functions, properties of Laplace transforms, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, Division by t, Evaluation of improper integrals.
Inverse Laplace transforms–Method of partial fractions, other methods of finding inverse transforms, Convolution theorem (without proof). **Application:** Application to differential equations.

UNIT-III: Fourier Series & Fourier Transforms:

Euler's formulae (without proof), Conditions of Fourier expansion, Functions having points of discontinuity, Change of inerval, Even and odd functions, Half-range series. Fourier Integral theorem (without proof), Fourier cosine & sine integral, complex form of Fourier integral, Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms (without proof), Convolution theorem(without proof), finite & infinite Fourier sine & cosine transforms.

UNIT-IV: Partial Differential Equations:

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Method of separation of Variables, Applications: One-dimensional wave and heat equations, two-dimensional heat equation.

UNIT-V: Z-Transforms: (all properties without proofs)

Introduction, definition, some standard z-transforms, linearity property, damping rule, some standard results, shifting U_n to the right, multiplication by n, initial and final value theorems, Inverse z-transforms, convolution theorem, evaluation of inverse z-transforms by partial fractions, applications to difference equations.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH II SEMESTER **BSC**

L	T	P	C
3	0	0	3

20AD2T02 APPLIED PHYSICS

Pre-requisite: Knowledge of basic concepts of waves, Optics, Electricity and Magnetism

Course Objective: Objective of the course is to impart

- ***Knowledge*** of fundamentals of Physics which helps them in the study of advanced topics of Engineering.
- ***Develop*** analytical capability and understand various Engineering concepts.

Course Outcomes:

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

CO1: ***Impart*** knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes

CO2: ***Gain*** knowledge of applications of lasers and optical fibers in various fields .

CO3: ***Classify*** magnetic and dielectric materials and their Engineering applications.

CO4: ***Understand*** basic quantum mechanics and free electron theories.

CO5: ***Obtain*** the concept of concept of holes and electrons in semiconductors.

SYLLABUS

UNIT-I: Wave Optics:

Interference*:* Introduction-Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Colors in thin films-Newton's rings-Determination of wave length nd refractive index.

Diffraction: C Introduction- Fresnel and Fraunhofer diffraction - Fraunhofer Diffraction due to Single slit, Double slit, N –slits(Qualitative) - Diffraction Grating – Resolving Power of Grating(Qualitative).

Polarizations: Introduction- Types of polarization-polarization by reflection, refraction and Double refraction-Nicol's prism –Half and Quarter wave plates.

UNIT-II: Lasers and Fiber Optics:

Lasers:: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping Schemes – Ruby laser – He-Ne laser - Applications of lasers.

***Fiber optics*:** Introduction –Principle of optical fiber-Construction- - Acceptance Angle - Numerical Aperture -Classification of optical fibers based on refractive index profile and modes .

UNIT-III: Magnetic and Dielectric Materials:

***Magnetic Materials*:** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials: Dia, para ferro, anti ferro & ferri – Domain concept of Ferromagnetism(Qualitative) - Hysteresis – soft and hard magnetic materials .

***Dielectric Materials*:** Introduction - Dielectic polarization **–** Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation.

UNIT-IV: Quantum Mechanics,Free Electron Theory:

***Quantum Mechanics*:** Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

***Free Electron Theory*:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Equation for electrical conductivity based on quantum free electron theory- Fermi-Dirac distribution- Density of States(3D),Fermi energy.

UNIT-V: Band Theory of Solids and Semiconductors:

Band theory of Solids: Introduction- Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - V vs K diagram - effective mass of electron – Classification of crystalline solids–concept of hole.

***Semiconductors:*:**Introduction– Intrinsic semi conductors - density of charge carriers - Electrical conductivity – Fermi level – extrinsic semiconductors - p-type & n-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature – Drift and Diffusion currents – Einstein's equation-Hall effect- Hall coefficient - Applications of Hall effect.

Text Books

1. "A Text book of Engineering Physics" by M.N. Avadhanulu, P.G. Kshirsagar - S. Chand Publications, 2019.
2. "Engineering Physics" by D.K. Bhattacharya and Poonam Tandon, Oxford press (2015).

3. "Engineering Physics" by R.K Gaur. and S.L Gupta., - Dhanpat Rai publishers, 2012.

Reference Books

1. Applied Physics by P.K. Palanisamy, Scitech publications (2014).
2. Engineering Physics by M. Arumugam, Anuradha Publication (2014).
3. Physics for Engineers by M.R. Srinivasan, New Age international publishers (2009).

B.TECH II SEMESTER	ESC	L	T	P	C
		3	0	0	3

20AD2T03 COMPUTER ORGANIZATION

Course Objectives:

- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
- It provides an in depth understanding of basic organization, design, programming of a simple digital computer, computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems.

Course Outcomes

By the end of the course the student will be able to

CO1: Demonstrate an understanding of the design of the functional units of a digital computer system. Relate Postulates of Boolean algebra and minimize combinational functions

CO2: Design and analyze combinational and sequential circuits

CO3: Implementation of computer arithmetic operations and to know the basic computer instruction formats

CO4: Obtain how micro programmed control is used to interact with units of components of CPU

CO5: Understanding of organization and architecture of input output and memory

SYLLABUS

UNIT I:

Digital Components and Data Representation:

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation, other Binary codes, Error Detection Codes

Digital Components: Digital Components, logic gates, Boolean Algebra, Map Simplification

UNIT II:

Digital logic circuits: Combinatorial Circuits: Introduction, Combinatorial Circuit Decoders, Multiplexers.

Sequential Circuits: Flip-Flops-SR Flip flop, D Flip flop, JK Flip flop, T Flip flop, Edge Triggered File flop. Sequential Circuits: flip flop input equations, state table, state diagram, Design example and procedure Registers, Shift Registers, Binary Counters

UNIT III:

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT IV:

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT V:

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory.

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access.

Text Books:

1. Computer System Architecture, 3rded., M.MorrisMano, PHI

Reference Books:

1. Digital Logic and Computer Organization, Rajaraman, Radhakrishnan, PHI, 2006
2. Computer Organization, 5thed., Hamacher, Vranesic and Zaky,TMH,2002
3. Computer Organization & Architecture: Designing for Performance, 7thed., William Stallings, PHI,

B.TECH II SEMESTER	**ESC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20AD2T04 DATA STRUCTURES

Course Objectives:

- Introduce the fundamental concept of data structures and abstract data types
- Emphasize the importance of data structures in developing and implementing efficient algorithms
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms

Course Outcomes:

CO1: Understand the properties, interfaces, and behaviors of basic abstract data types.

CO2: Understand and apply linked lists

CO3: Apply Stacks and Queue data structures.

CO4: Demonstrate different methods for traversing trees.

CO5: Demonstrate the application of Graphs

SYLLABUS

UNIT I

Data Structures - Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity.

Searching - Linear search, Binary search, Fibonacci search.

Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), merging (Merge sort) algorithms.

UNIT II

Linked List: Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal, Reversing Single Linked list, Applications on Single Linked list- Polynomial Expression Representation, Addition and Multiplication, Sparse Matrix Representation using Linked List, Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular Linked list-Insertion, Deletion.

UNIT III

Queues: Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list, Application of Queues- Circular Queues

Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, Linked list Representation of Stacks, Operations on Linked Stack, Applications- Infix to Postfix Conversion, Evaluating Postfix Expressions.

UNIT IV

Trees: Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Trees sing Arrays and Linked lists. Binary Search Trees- Basic Concepts, BST Operations: Insertion, Deletion, Tree Traversals, Applications-Expression Trees, Heap Sort, Balanced Binary Trees- AVL Trees, Insertion, Deletion and Rotations.

UNIT V

Graphs: Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prims &Kruskals Algorithm, Dijkstra's shortest path, Transitive closure, Warshall's Algorithm.

Text Books:

1. Data Structures Using C. 2ndEdition. Reema Thareja, Oxford.
2. Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

Reference Books:

1. Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.
2. Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
3. Data Structures with C, Seymour Lipschutz TMH

B.TECH II SEMESTER	**ESC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20AD2T05 PYTHON PROGRAMMING

Course Objectives:

- Identify/characterize/define a problem
- Design a program to solve the problem
- Create executable code
- Read most Python code

Course Outcomes:

CO1: Understand the fundamentals of Python programming language.

CO2: Understand Data Structures

CO3: Understand the use of functions in Python

CO4: Understand the Object-Oriented Programming concepts of Python

CO5: Apply regular expressions for different situations.

SYLLABUS

UNIT – I:

Introduction: History of Python, Need of Python Programming, Applications of Python Programming Variables, Assignment, Keywords, Input-Output, Indentation.

Types, Operators, and Expressions: Types – Integers, Strings, Booleans; Operators-Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while break, continue, pass

UNIT – II:

Data Structures Lists – Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT – III:

Functions – Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function-Global and Local Variables. Modules: Creating modules, import statements, from. The import statement, name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

UNIT – IV:

Object-Oriented Programming OOP in Python: Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, Error, and Exceptions: Difference between an error and Exception, Handling Exception, try except for block, Raising Exceptions, User Defined Exceptions

UNIT – V:

Regular expressions: Power of pattern matching and searching using regex in python, Meta characters and Sequences used in Patterns, Password, email, URL validation using regular expression, Pattern finding programs using regular expression.

Text Books:

1. Learning Python, Mark Lutz, Orielly
2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. Reema Thareja, "Python Programming using Problem Solving Approach", ISBN-13:978-0-19- 948017-3, Oxford University Press, 2017.

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage
4. "Python in easy steps In Easy Steps", Mike MC Grath, illustrated edition, In easy steps 2013 publishers.
5. Professional Python Frameworks: Web 2.0 Programming, Dana Moore, Raymond Budd, William Wright, Wrox Publication, ISBN: 978-0-470-13809-0, October 2007.

		L	T	P	C
B.TECH II SEMESTER	**BSC**	**0**	**0**	**3**	**1.5**

20AD2L06 APPLIED PHYSICS LAB

Pre-requisite: Fundamental understanding of usage of an instrument with proper care.

Course Objective: Objective of the course is to impart

- Training Engineering graduates to handle instruments and their usage methods to improve the accuracy of measurements.

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

CO1: **Outcomes**: The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

CO2: Implement the basic principles of Mechanics to measure different physical parameters.

CO3: Enhance the knowledge of Usage of electronic devices in various applications

SYLLABUS

1. Newton's rings –Determination of radius of curvature of Plano Convex Lens.
2. Determination of wavelength of spectral lines -Diffraction Grating
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of wavelength of laser source using diffraction grating
5. Determination of Numerical Aperture and bending loss of a given Optical Fiber.
6. Determination of dispersive power of prism.
7. Determination of Rigidity modulus of a material- Torsional Pendulum.
8. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
9. Determination of Young's modulus by method of single cantilever oscillations
10. Verification of laws of vibrations in stretched strings – Sonometer.

11. Estimation of Planck's Constant using Photo electric Effect
12. Study of I /V Characteristics of Semiconductor diode.
13. I/V characteristics of Zener diode.
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus
15. Energy Band gap of a Semiconductor using p - n junction diode

Reference Books

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017.

		L	T	P	C
B.TECH II SEMESTER	**ESC**	**0**	**0**	**3**	**1.5**

20AD2L07 DATA STRUCTURES LAB

Course Objectives:

The objective of this lab is to

- Demonstrate the different data structures implementation.

Course Outcomes:

- Use basic data structures such as arrays and linked list.
- Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
- Use various searching and sorting algorithms.

List of Experiments:

Exercise -1 (Searching)

a) Write C program that use both recursive and non-recursive functions to perform Linear search for a Key value in a given list.

b) Write C program that use both recursive and non-recursive functions to perform Binary search for a Key value in a given list.

Exercise -2 (Sorting-I)

a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order.

b) Write C program that implement Quick sort, to sort a given list of integers in ascending order.

c) Write C program that implement Insertion sort, to sort a given list of integers in ascending order.

Exercise -3 (Sorting-II)

a) Write C program that implement radix sort, to sort a given list of integers in ascending order

b) Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise -4 (Singly Linked List)

a) Write a C program that uses functions to create a singly linked list

b) Write a C program that uses functions to perform insertion operation on a singly linked list

c) Write a C program that uses functions to perform deletion operation on a singly linked list

d) Write a C program to reverse elements of a single linked List.

Exercise -5 (Queue)

a) Write C program that implement Queue (its operations) using arrays.

b) Write C program that implement Queue (its operations) using linked lists

Exercise -6 (Stack)

a) Write C program that implement stack (its operations) using arrays

b) Write C program that implement stack (its operations) using Linked list

c) Write C program for implementing infix to postfix conversion

d) Write a C program that uses Stack operations to evaluate postfix expression

Exercise -7 (Binary Tree)

Write a recursive C program for traversing a binary tree in preorder, in-order and post-order.

Exercise -8 (Binary Search Tree)

a) Write a C program to Create a BST

b) Write a C program to insert a node into a BST.

c) Write a C program to delete a node from a BST.

Exercise-9

Write a program for implementing Heap Sort.

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B.TECH II SEMESTER		**ESC**	**0**	**0**	**3**	**1.5**

20AD2L08 PYTHON PROGRAMMING LAB

Course Objectives:

The objective of this lab is to

- To elucidate problem solving through python programming language.
- To introduce function-oriented programming paradigm through python.
- To train in development of solutions using modular concepts.
- To teach practical Python solution patterns

Course Outcomes

CO1: Develop fundamental programs in python programming language.

CO2: Develop Python programs for numerical and text-based problems.

CO3: Develop Python programs on object-oriented programming and regular expressions.

CO4: Develop python programs on data structures.

LIST OF EXPERIMENTS

1. Write a program to perform various list of operations (eg: Arithmetic, logical, bitwise etc) in python.
2. Write a program to implement control flow statements.
3. Write a program implementing various predefined function of Lists, Sets, Tuples and Dictionaries.
4. Write a program covering various arguments for a function.
5. Write a program to implement various types of functions.
6. Write a program to implement recursion.
7. Write a program to implement command line arguments.
8. Write a program to create a class and its constructors.
9. Write a program to implement inheritance.
10. Write a program for exception handling.
11. Write a program to perform various linear algebra operations like finding eigen values and vectors, determinant and trace for a matrix.

12. Write a program to perform matrix operations like addition, subtraction, multiplication of matrices using Numpy Module.
13. Write a program to use System, math etc., packages.
14. Write a Python program to find the occurrence and position of the substrings within a string.
15. Write a Python program to replace all occurrences of space, comma, or dot with a colon.
16. Write a Python program to match a string that contains only upper and lowercase letters, numbers, and underscores.

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B.TECH I SEMESTER	**BSC**	**3**	**0**	**0**	**3**

20AM1T01 LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

Pre-requisite: Basic knowledge about matrices, differentiation and integration

Course Objective: Objective of the course is to impart

- Basic understanding of mathematical methods to solve simultaneous linear systems
- Understanding of formation and solutions of ordinary differential equations
- Knowing the mathematical methods to solve applications of differential equations

Course Outcomes:

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

CO1: Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations

CO2: Illustrate the methods of computing eigen values and eigen vectors

CO3: Able to analyze the real life situations, formulate the differential equations and then applying the methods

CO4: Determine the solutions of linear differential equations

CO5: Optimize functions of several variables and able to find extreme values of constrained functions

SYLLABUS

UNIT-I: Linear systems of equations:

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence of vectors, Consistency of linear system of equations, System of linear homogeneous equations, Gauss-elimination and Gauss -Jordan methods.

UNIT-II: Eigen values & Eigen vectors:

Eigen values, Eigen vectors, Properties of Eigen values (without proofs), Cayley-Hamilton theorem (without proof), finding inverse and powers of a matrix using C-H theorem, Reduction to diagonal form, reduction of quadratic form to canonical form using orthogonal reduction, nature of quadratic forms.

UNIT-III: Ordinary Differential Equations of first order:

Linear equations, Bernoulli's equation, Exact differential equations. Equations reducible to exact equations, **Applications:** Orthogonal Trajectories, Newton's Law of cooling, Rate of decay & growth, R-L series circuits.

UNIT-IV: Linear Differential Equations higher order:

Definitions, Complete solution (without proof), Operator D, Rules to find complementary function, Inverse operator, Rules to find the particular integral(nonhomogeneous term of the form e^{ax}, sin(ax+b), cos(ax+b), polynomials in x^m, e^{ax}V(x), any other function), Method of variation of parameters.

UNIT-V: Partial Differentiation:

Functions of two variables, Partial derivatives, Homogeneous functions, Euler's theorem, Total derivative, Jacobian and functional dependence, Taylor's theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH I SEMESTER	BSC	L	T	P	C
		3	0	0	3

20AM1T02 APPLIED CHEMISTRY

Pre-requisite: Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the availableresources

Course Objective: Objective of the course is to impart

- Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
- Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
- Explain the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- Recall the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- Outline the basics of green chemistry and molecular switches

Course Outcomes: At the end of the course, student will be able to

CO1: Analyze the different types of composite plastic materials and interpret the mechanism ofconduction in conducting polymers.

CO2: Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning newengineering products and categorize the reasons for corrosion and study methods to control corrosion.

CO3: Synthesize nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystalsand superconductors.

CO4: Design models for energy by different natural sources.
Analyze the principles of different analytical instruments and their applications.

CO5: Obtain the knowledge of green chemistry and molecular machines

SYLLABUS

UNIT-I: Polymer Technology

Polymerisation: Introduction, methods of polymerization (addition and Condensation), Physical and mechanical properties.

Plastics: Compounding, fabrication (compression, injection, blown film and extrusion), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets.

Elastomers: Natural rubber-Drawbacks-vulcanization, preparation, properties and applications (Buna S, thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics – GFRP and Aramid FRP

Conducting polymers: Intrinsic and extrinsic conducting polymers

Biodegradable polymers: preparation and applications

UNIT-II: Electrochemical Cells And Corrosion

Part I: ELECTROCHEMICAL CELLS: Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells (H_2-O_2, CH_3OH-O_2, phosphoric acid and molten carbonate).

Part II: Corrosion: Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, galvanic series, factors influencing rate of corrosion, corrosion control (cathodic protection), Protective coatings (cathodic coatings, anodic coatings, electroplating and electroless plating)

UNIT-III: Material Chemistry

Part I: Non-elemental semiconducting materials: Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling technique) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

Super conductors:-Type –I, Type II-characteristics and applications

Part II: Nano materials: Introduction, sol-gel method, characterization by (Brunauer Emmet Teller[BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]), applications of graphene and fullerenes, carbon nanotubes (types, preparation and applications)

Liquid crystals: Introduction-types-applications.

UNIT-IV: Non-Conventional Energy Sources & Spectroscopy

Part I: NON-CONVENTIONAL ENERGY SOURCES

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, tidal and wave power, ocean thermal energy conversion.

Part II: **SPECTROSCOPY**

UV spectroscopy- Basic principle-Instrumentation-Applications

IR spectroscopy- Basic principle-Instrumentation-Applications

NMR spectroscopy- Basic principle-Instrumentation-Applications

UNIT-V: Advanced Concepts/Topics In Chemistry

Part-I: Green chemistry: Introduction, Principles of green chemistry, Green synthesis-Aquaeous Phase method-Microwave method-Phase transfer catalysis method, R4M4 principles (Econoburette).

PART-II: Molecular switches: characteristics of molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid- base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor.

Text Books:

1. P.C. Jain and M. Jain "Engineering Chemistry", 15/e, Dhanpat Rai & Sons, Delhi,(Latest edition).
2. Shikha Agarwal, "Engineering Chemistry", Cambridge University Press, New Delhi,(2019).
3. S.S. Dara, "A Textbook of Engineering Chemistry", S.Chand & Co, (2010).
4. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai Publicating Co. (Latest edition).

References:

1. K. Sesha Maheshwaramma and Mridula Chugh, "Engineering Chemistry", Pearson India
2. O.G. Palana, "Engineering Chemistry", Tata McGraw Hill Education Private Limited,(2009).
3. CNR Rao and JM Honig (Eds) "Preparation and characterization of materials" Academic press, New York (latest edition)
4. B. S. Murthy, P. Shankar and others, "Textbook of Nanoscience and Nanotechnology",University press (latest edition)

B.TECH I SEMESTER	HSMC	L	T	P	C
		3	0	0	3

20AM1T03 ENGLISH

Pre-requisite:

Course Objective:

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Course Outcomes: At the end of the course, student will be able to

CO1	understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
CO2	ask and answer general questions on familiar topics
CO3	employ suitable strategies to master the art of letter writing and email writing
CO4	recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
CO5	form sentences using proper grammatical structures and correct word forms

SYLLABUS

UNIT-I	A Drawer full of happiness (Detailed Study) Deliverance (Non-detailed Study)
UNIT-II	Nehru's letter to his daughter Indira on her birthday(Detailed Study) Bosom Friend (Non-detailed Study)
UNIT-III	Stephen Hawking-Positivity 'Benchmark' (Detailed Study) Shakespeare's Sister(Non-detailed Study)
UNIT-IV	Liking a Tree, Unbowed: Wangari Maathai-biography (Detailed Study)

	Telephone Conversation(Non-detailed Study)
UNIT-V	Stay Hungry-Stay foolish (Detailed Study) Still I Rise(Non-detailed Study)

Text Books

1. "Infotech English", Maruthi Publications. (Detailed)
2. "The Individual Society", Pearson Publications.(Non-detailed)

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

B.TECH I SEMESTER	**ESC**	**L**	**T**	**P**	**C**
		1	**0**	**4**	**3**

20AM1L04 COMPUTER ENGIENERING WORKSHOP

Course Objectives:

Skills and knowledge provided by this subject are the following:

- **PC Hardware:** Identification of basic peripherals, Assembling a PC, Installation of system software like MS Windows, device drivers, etc. Troubleshooting of PC Hardware and Software issues.
- **Internet & World Wide Web:** Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber attacks.
- **Productivity Tools:** Understanding and practical approach of professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite office tools.

Course Outcomes:

CO1: Identify, assemble and update the components of a computer

CO2: Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems

CO3: Make use of tools for converting pdf to word and vice versa

CO4: Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex

LIST OF EXERCISES

Task 1: Identification of the peripherals of a computer - Prepare a report containing the block diagram of the computer along with the configuration of each component and its functionality. Describe about various I/O Devices and its usage.

Task 2: Practicing disassembling and assembling components of a PC

Task 3: Installation of Device Drivers, MS Windows, Linux Operating systems and Disk Partitioning, dual boating with Windows and Linux.

Task 4: Introduction to Memory and Storage Devices, I/O Port, Assemblers, Compilers, Interpreters, Linkers and Loaders.

Task 5: Demonstration of Hardware and Software Troubleshooting

Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth Technology, Wireless Technology, Modem, DSL, and Dialup Connection.

Task 7: Surfing the Web using Web Browsers, Awareness of various threats on the Internet and its solutions, Search engines and usage of various search engines, Need of anti-virus, Installation of anti-virus, configuring personal firewall and windows update.

(Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and popup blockers)

Productivity Tools:

Task 8: Basic HTML tags, Introduction to HTML5 and its tags, Introduction to CSS3 and its properties. Preparation of a simple website/ homepage,

Assignment: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

Features to be covered:- Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, etc.,

Task 9: Demonstration and Practice of various features of Microsoft Word

Assignment:

1. Create a project certificate.

2. Creating a news letter

Features to be covered:-Formatting Fonts, Paragraphs, Text effects, Spacing, Borders and Colors, Header and Footer, Date and Time option, tables, Images, Bullets and Numbering, Table of Content, Newspaper columns, Drawing toolbar and Word Art and Mail Merge in word etc.,

Task 10: Demonstration and Practice of various features Microsoft Excel

Assignment: 1. Creating a scheduler

2. Calculating GPA

3. Calculating Total, average of marks in various subjects and ranks of students based on marks

Features to be covered:Format Cells, Summation, auto fill, Formatting Text, Cell Referencing, Formulae in excel, Charts, Renaming and Inserting worksheets, etc.,

Task 11: Demonstration and Practice of various features Microsoft Power Point

Features to be covered:Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Hyperlinks Tables and Charts, Master Layouts, Types of views, Inserting – Background, textures, Design Templates, etc.,

Task 12: Demonstration and Practice of various features LaTeX – document preparation, presentation (Features covered in Task 9 and Task 11 need to be explored in LaTex)

Task 13: Tools for converting word to pdf and pdf to word

Task 14: Internet of Things (IoT): IoT fundamentals, applications, protocols, communication models, architecture, IoT devices

Reference Books:

1. Computer Fundamentals, Anita Goel, Pearson India Education, 2017

2. PC Hardware Trouble Shooting Made Easy, TMH

3. Introduction to Information Technology, ITL Education Solutions Limited, 2nd Edition, Pearson, 2020

4. Upgrading and Repairing PCs, 18th Edition, Scott Mueller, QUE, Pearson, 2008

5. LaTeX Companion – Leslie Lamport, PHI/Pearson

6. Introducing HTML5, Bruce Lawson, Remy Sharp, 2nd Edition, Pearson, 2012

7. Teach yourself HTML in 24 hours, By Techmedia

8. HTML 5 and CSS 3.0 to the Real World by Alexis Goldstein, Sitepoint publication.

9. Internet of Things, Technologies, Applications, Challenges and Solutions, B K Tripathy, J Anuradha, CRC Press

10. Comdex Information Technology Course Tool Kit, Vikas Gupta, Wiley Dreamtech.

11. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme, CISCO Press, Pearson Education.

12. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N. B. Venkateswarlu, S. Chand Publishers

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B.TECH I SEMESTER		**ESC**	**3**	**0**	**0**	**3**

20AM1T05 PROBLEM SOLVING THROUGH C

Pre-requisite:

Course Objective:

- To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C. To learn about the design concepts of arrays, strings, enumerated structure and union types and their usage. To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor. To assimilate about File I/O and significance of functions

Course Outcomes: At the end of the course, student will be able to

CO1: Understand the basic concepts of programming

CO2: Understand and Apply loop construct for a given problem

CO3: Demonstrate the use pointers

CO4: Understand the use of functions and develop modular reusable code

CO5: Understand File I/O operations

SYLLABUS

UNIT-I:

INTRODUCTION TO COMPUTERS: Functional Components of computer, computer software, categories of memory, types of programming languages, Development of algorithms, flow charts, software development process, Computer Numbering system

BASICS OF C PROGRAMMING: Introduction to programming paradigms, Structure of C program, Data Types, C Tokens, Operators: Precedence and Associativity, Expressions Input/output statements, Assignment statements

UNIT-II:

Decision making statements: if, if else, nester if. Multi way decision making statements: else if, Switch statement. **Loop statements**: while, do while, for, Compilation process.

UNIT-III:

Introduction to Arrays: Declaration, Initialization, One dimensional array, Example Programs on one dimensional array, Selection sort, linear and binary search, two dimensional arrays, Matrix Operations, Multi-dimensional Arrays

Strings: Declaration, String operations: length, compare, concatenate, copy, String handling functions.

UNIT-IV:

FUNCTIONS: Introduction to functions: Function prototype, function definition, function call, Built-in functions, Recursion, Storage classes, Passing Arrays & Strings to the functions, Preprocessor directives

POINTERS: Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers, Array of pointers, Parameter passing: Pass by value, Pass by reference, Dynamic Memory Allocation

UNIT-V:

STRUCTURES AND UNIONS: Structure, Nested structures, Pointer and Structures, Array of structures, Example Program using structures and pointers, Self-referential structures, Unions.

FILE PROCESSING: Files, Types of file processing: Sequential access, Random access, Sequential access file, Random access file, Command line arguments

Text Books:

1. Krnighan. B.W and Ritche, D.M, “The C Programming Language”, Second Edition, Pearson Education, 2006

2. ReemaThareja, “Programming in C”, Oxford University Press, Second Edition, 2016.

References:

1. Pradepdey, Manas Ghosh, “Fundamentals of Computing and programming in C”, First Edition, Oxford University Press, 2009.
2. Paul Deitel and Harvey Deitel, “C How to Program”, Seventh Edition, Pearson Publication.
3. E Balagursamy, “Programming in C, Sixth Edition, Tata McGraw Hill.
4. Ajay Mittal, “Programming in C A practical Approach”, Pearson education

B.TECH I SEMESTER	HSMC	L	T	P	C
		0	0	3	1.5

20AM1L06 ENGLISH COMMUNICATION SKILLS LAB

Course Objectives:

- Facilitate effective usage of functional English through role plays
- Focus on vocabulary enhancement
- Foster various nuances of phonetics and accent neutralization

Course Outcomes: At the end of the course, student will be able to

CO1: Acquire basic proficiency in English by learning functional aspects of English language

CO2: Learn the methods of enhancing vocabulary

CO3: Acquaint himself/herself with nuances of Phonetics

LIST OF EXPERIMENTS

1 Greetings and Introductions
2 Requesting Permission & Giving Directions
3 Inviting/Complaining/Congratulating
4 Root Words
5 Phonetics-Sounds and Symbols
6 Pronunciation Rules

References:

1. Strengthen Your Steps, Maruti Publications
2. Interact, Orient Blackswan
3. Word Power Made Easy, Pocket Books

B.TECH I SEMESTER	BSC	L	T	P	C
		0	0	3	1.5

20AM1L07 APPLIED CHEMISTRY LAB

Pre-requisite: Acquire some experimental skills.

Course Objective: Objective of the course is to impart

- The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations.
- A few instrumental methods of chemical analysis.

Course Outcomes:

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

CO1: The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

LIST OF EXPERIMENTS

1. Determination of HCl using standard Na2CO3 solution.
2. Determination of alkalinity of a sample containing Na2CO3 and NaOH.
3. Determination of Mn+2 using standard oxalic acid solution.
4. Determination of ferrous iron using standard K2Cr2O7 solution.
5. Determination of Cu+2 using standard hypo solution.
6. Determination of temporary and permanent hardness of water using standard EDTA solution.
7. Determination of Fe+3 by a colorimetric method.
8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).
9. Determination of iso-electric point of amino acids using pH-metry method/conductometric method
10. Determination of the concentration of strong acid vs strong base (by conductometric method).
11. Determination of strong acid vs strong base (by potentiometric method).

12 Determination of Mg^{+2} present in an antacid.

13 Determination of $CaCO_3$ present in an egg shell.

14 Estimation of Vitamin C.

15 Determination of phosphoric content in soft drinks.

16 Adsorption of acetic acid by charcoal.

17 Preparation of nylon-6, 6 and Bakelite (demonstration only).

B.TECH I SEMESTER	ESC	L	T	P	C
		0	0	3	1.5

20AM1L08 PROBLEM SOLVING THROUGH C LAB

Course Objectives:

- Apply the principles of C language in problem solving.
- To design flowcharts, algorithms and knowing how to debug programs.
- To design & develop of C programs using arrays, strings pointers &functions.
- To review the file operations, preprocessor commands.

Course Outcomes:

- Demonstrate Knowledge on various concepts of a C language.
- Able to draw flowcharts and write algorithms.
- Able design and development of C problem solving skills.
- Able to design and develop modular programming skills.
- Able to trace and debug a program

Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5inches.
3. Write a C program to display multiple variables.

Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.

2. Write a program in C to display the n terms of harmonic series and their sum. 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6:

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.
2. Write a program in C to add two numbers using pointers.

Exercise 11:

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13:

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc( )function.

Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc( ) function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16:

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name
3. Write a program in C to remove a file from the disk.

B.TECH I SEMESTER

	L	T	P	C
MC	2	0	0	--

20AM1M09 ENVIRONMENTAL SCIENCE

Course objective:

To understand the importance of Environment and the importance of biodiversity

Course outcomes:

- The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
- The concepts of the ecosystem and its function in the environment.
- 3.The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
- The environmental legislations of India and Social issues and the possible means
- Environmental assessment and the stages involved in EIA.

SYLLABUS

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Introduction- Scope of Environmental Studies- Importance of Environmental Studies- Need for public awareness, Environmental ethics- Contemporary Environmentalists- Environmental Global moves: Stockholm conference, Earth summit

Concept of an ecosystem - Structure of an ecosystem- function of an ecosystem- Food chains, food webs- ecological pyramids- Energy flow in the ecosystem- Ecological succession- Nutrient cycling- 1^oproduction& 2^oproduction- Major ecosystems: Forest ecosystem- Grassland ecosystem, Desert ecosystem- Aquatic ecosystem: pond, Lake Ecosystem- Streams, river ecosystem, Oceans

UNIT-II: NATURAL RESOURCES AND CONSERVATION

Introduction and classification of natural resources-Forest resources**:** Use and over-exploitation- Deforestation-Timber extraction-Mining- Conservation-Water resources**:** Use and over utilization of surface and ground water,- Floods, drought, Dams and associated problems- Water conservation, rain water harvesting, water shed management-Energy resources**:** renewable energy sources –solar-wind-hydro-tidal- Ocean thermal-geo thermal-bio mass-bio gas-bio fuels- Hydrogen.- Non-renewable energy sources-coal-petroleum-natural gas-Nuclear energy

UNIT-III: **BIODIVERSITY AND ITS CONSERVATION**

Definition, classification- Value of biodiversity-Threats to biodiversity: habitat loss, man-wildlife conflicts- Endangered and endemic species of India-Conservation of biodiversity- Biodiversity at national and local levels, Hot-sports of biodiversity

UNIT-IV: ENVIRONMENTAL PROBLEMS

Global warming, Climate change- Acid rain, Ozone depletion- Air pollution- Water pollution- Soil pollution- Noise pollution, Nuclear hazards- Solid Waste Management: Causes, Consequences and Control methods- Solid Waste Management- Population growth and explosion, effects, control measures- Pollution case studies- Role of an individual in prevention of pollution

UNIT-V: ENVIRONMENTALLEGISLATION & MANAGEMENT

Sustainable development- Air (Prevention and Control of Pollution) Act-Drawbacks-Water (Prevention and control of Pollution) Act- Drawbacks- Wildlife Protection Act-Drawbacks- Forest Conservation Act- Drawbacks- Environmental Protection Act-Drawbacks- Environmental Impact Assessment and its significance- Preparation of Environmental Management Plan and Environmental Impact Statement- Ecotourism

TEXT BOOKS:

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age Publications, New Delhi

2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

4. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCES:

1. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.

2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi

3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi

4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Delhi

B.TECH II SEMESTER	BSC	L	T	P	C
		3	0	0	3

20AM2T01 TRANSFORM TECHNIQUES

Pre-requisite: Linear Algebra and Differential Equations

Course Objective: Objective of the course is to impart

- Learning the techniques of Laplace transforms to solve ordinary differential equations
- knowledge of Fourier series & Fourier transforms for piecewise continuous functions
- knowledge of solving boundary valued problems

Course Outcomes: At the end of the course, student will be able to

CO1: Able to analyze a class of integrals in terms of beta and gamma functions

CO2: Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing

CO3: Analyze the general periodic functions in the form of an infinite convergent sine and cosine series

CO4: Illustrate the methods to solve the boundary value problems

CO5: Determine a solution of a discrete system using Z- transforms

SYLLABUS

UNIT-I: Special functions:

Beta function, Properties & problems, Gamma function, properties & problems, Relation between Beta and Gamma functions, Evaluation of improper integrals.

UNIT-II: Laplace Transforms (all properties without proofs):

Definition, Transforms of elementary functions, properties of Laplace transforms, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, Division by t, Evaluation of improper integrals.
Inverse Laplace transforms–Method of partial fractions, other methods of finding inverse transforms, Convolution theorem (without proof). **Application:** Application to differential equations.

UNIT-III: Fourier Series & Fourier Transforms:

Euler's formulae (without proof), Conditions of Fourier expansion, Functions having points of discontinuity, Change of inerval, Even and odd functions, Half-range series.
Fourier Integral theorem (without proof), Fourier cosine & sine integral, complex form of Fourier integral, Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms (without proof), Convolution theorem(without proof), finite & infinite Fourier sine & cosine transforms.

UNIT-IV: Partial Differential Equations:

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Method of separation of Variables, Applications: One-dimensional wave and heat equations, two-dimensional heat equation.

UNIT-V: Z-Transforms: (all properties without proofs)

Introduction, definition, some standard z-transforms, linearity property, damping rule, some standard results, shifting U_n to the right, multiplication by n, initial and final value theorems, Inverse z-transforms, convolution theorem, evaluation of inverse z-transforms by partial fractions, applications to difference equations.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH II SEMESTER	**BSC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20AM2T02 APPLIED PHYSICS

Pre-requisite: Knowledge of basic concepts of waves, Optics, Electricity and Magnetism

Course Objective: Objective of the course is to impart

- ***Knowledge*** of fundamentals of Physics which helps them in the study of advanced topics of Engineering.
- ***Develop*** analytical capability and understand various Engineering concepts.

Course Outcomes:

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

CO1: ***Impart*** knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes

CO2: ***Gain*** knowledge of applications of lasers and optical fibers in various fields .

CO3: ***Classify*** magnetic and dielectric materials and their Engineering applications.

CO4: ***Understand*** basic quantum mechanics and free electron theories.

CO5: ***Obtain*** the concept of concept of holes and electrons in semiconductors.

SYLLABUS

UNIT-I: Wave Optics:

Interference*:* Introduction-Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Colors in thin films-Newton's rings-Determination of wave length nd refractive index.

Diffraction: C Introduction- Fresnel and Fraunhofer diffraction - Fraunhofer Diffraction due to Single slit, Double slit, N –slits(Qualitative) - Diffraction Grating – Resolving Power of Grating(Qualitative).

Polarizations: Introduction- Types of polarization-polarization by reflection, refraction and Double refraction-Nicol's prism –Half and Quarter wave plates.

UNIT-II: Lasers and Fiber Optics:

Lasers:: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping Schemes – Ruby laser – He-Ne laser - Applications of lasers.

***Fiber optics*:** Introduction –Principle of optical fiber-Construction- - Acceptance Angle - Numerical Aperture -Classification of optical fibers based on refractive index profile and modes .

UNIT-III: Magnetic and Dielectric Materials:

***Magnetic Materials*:** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials: Dia, para ferro, anti ferro & ferri – Domain concept of Ferromagnetism(Qualitative) - Hysteresis – soft and hard magnetic materials .

***Dielectric Materials*:** Introduction - Dielectic polarization **–** Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation.

UNIT-IV: Quantum Mechanics,Free Electron Theory:

***Quantum Mechanics*:** Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

***Free Electron Theory*:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Equation for electrical conductivity based on quantum free electron theory- Fermi-Dirac distribution- Density of States(3D),Fermi energy.

UNIT-V: Band Theory of Solids and Semiconductors:

Band theory of Solids: Introduction- Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - V vs K diagram - effective mass of electron – Classification of crystalline solids–concept of hole.

***Semiconductors:*:**Introduction– Intrinsic semi conductors - density of charge carriers - Electrical conductivity – Fermi level – extrinsic semiconductors - p-type & n-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature – Drift and Diffusion currents – Einstein's equation-Hall effect- Hall coefficient - Applications of Hall effect.

Text Books

1. "A Text book of Engineering Physics" by M.N. Avadhanulu, P.G. Kshirsagar - S. Chand Publications, 2019.
2. "Engineering Physics" by D.K. Bhattacharya and Poonam Tandon, Oxford press (2015).

3. "Engineering Physics" by R.K Gaur. and S.L Gupta., - Dhanpat Rai publishers, 2012.

Reference Books

1. Applied Physics by P.K. Palanisamy, Scitech publications (2014).
2. Engineering Physics by M. Arumugam, Anuradha Publication (2014).
3. Physics for Engineers by M.R. Srinivasan, New Age international publishers (2009).

B.TECH II SEMESTER	ESC	L	T	P	C
		3	0	0	3

20AD2T03 COMPUTER ORGANIZATION

Course Objectives:

- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
- It provides an in depth understanding of basic organization, design, programming of a simple digital computer, computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems.

Course Outcomes

By the end of the course the student will be able to

CO1: Demonstrate an understanding of the design of the functional units **of** a digital computer system. Relate Postulates of Boolean algebra and minimize combinational functions

CO2: Design and analyze combinational and sequential circuits

CO3: Implementation of computer arithmetic operations and to know the basic computer instruction formats

CO4: Obtain how micro programmed control is used to interact with units of components of CPU

CO5: Understanding of **o**rganization and architecture of input output and memory

SYLLABUS

UNIT I:

Digital Components and Data Representation:

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation, other Binary codes, Error Detection Codes

Digital Components: Digital Components, logic gates, Boolean Algebra, Map Simplification

UNIT II:

Digital logic circuits: Combinatorial Circuits: Introduction, Combinatorial Circuit Decoders, Multiplexers.

Sequential Circuits: Flip-Flops-SR Flip flop, D Flip flop, JK Flip flop, T Flip flop, Edge Triggered File flop. Sequential Circuits: flip flop input equations, state table, state diagram, Design example and procedure Registers, Shift Registers, Binary Counters

UNIT III:

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT IV:

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT V:

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access

Text Books:

1. Computer System Architecture, 3rded., M.MorrisMano, PHI

Reference Books:

1. Digital Logic and Computer Organization, Rajaraman, Radhakrishnan, PHI, 2006
2. Computer Organization, 5thed., Hamacher, Vranesic and Zaky,TMH,2002
3. Computer Organization & Architecture: Designing for Performance, 7thed., William Stallings, PHI,

B.TECH II SEMESTER	**ESC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20AM2T04 DATA STRUCTURES

Course Objectives:

- Introduce the fundamental concept of data structures and abstract data types
- Emphasize the importance of data structures in developing and implementing efficient algorithms
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms

Course Outcomes:

CO1: Understand the properties, interfaces, and behaviors of basic abstract data types.

CO2: Understand and apply linked lists

CO3: Apply Stacks and Queue data structures.

CO4: Demonstrate different methods for traversing trees.

CO5: Demonstrate the application of Graphs

SYLLABUS

UNIT I

Data Structures - Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity.

Searching - Linear search, Binary search, Fibonacci search.

Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), merging (Merge sort) algorithms.

UNIT II

Linked List: Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal, Reversing Single Linked list, Applications on Single Linked list- Polynomial Expression Representation, Addition and Multiplication, Sparse Matrix Representation using Linked List, Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular Linked list-Insertion, Deletion.

UNIT III

Queues: Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list, Application of Queues- Circular Queues

Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, Linked list Representation of Stacks, Operations on Linked Stack, Applications- Infix to Postfix Conversion, Evaluating Postfix Expressions.

UNIT IV

Trees: Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Trees sing Arrays and Linked lists. Binary Search Trees- Basic Concepts, BST Operations: Insertion, Deletion, Tree Traversals, Applications-Expression Trees, Heap Sort, Balanced Binary Trees- AVL Trees, Insertion, Deletion and Rotations.

UNIT V

Graphs: Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prims &Kruskals Algorithm, Dijkstra's shortest path, Transitive closure, Warshall's Algorithm.

Text Books:

1. Data Structures Using C. 2ndEdition. Reema Thareja, Oxford.
2. Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

Reference Books:

1. Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.
2. Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
3. Data Structures with C, Seymour Lipschutz TMH

B.TECH II SEMESTER	**ESC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20AM2T05 PYTHON PROGRAMMING

Course Objectives:

- Identify/characterize/define a problem
- Design a program to solve the problem
- Create executable code
- Read most Python code

Course Outcomes:

CO1: Understand the fundamentals of Python programming language.

CO2: Understand Data Structures

CO3: Understand the use of functions in Python

CO4: Understand the Object-Oriented Programming concepts of Python

CO5: Apply regular expressions for different situations.

SYLLABUS

UNIT – I:

Introduction: History of Python, Need of Python Programming, Applications of Python Programming Variables, Assignment, Keywords, Input-Output, Indentation.
Types, Operators, and Expressions: Types – Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while break, continue, pass

UNIT – II:

Data Structures Lists – Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT – III:

Functions – Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function- Global and Local Variables. Modules: Creating modules, import statements, from. The import statement, name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

UNIT – IV:

Object-Oriented Programming OOP in Python: Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, Error, and Exceptions: Difference between an error and Exception, Handling Exception, try except for block, Raising Exceptions, User Defined Exceptions

UNIT – V:

Regular expressions: Power of pattern matching and searching using regex in python, Meta characters and Sequences used in Patterns, Password, email, URL validation using regular expression, Pattern finding programs using regular expression.

Text Books:

1. Learning Python, Mark Lutz, Orielly
2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.
3. Reema Thareja, "Python Programming using Problem Solving Approach", ISBN-13:978-0-19- 948017-3, Oxford University Press, 2017.

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage
4. "Python in easy steps In Easy Steps", Mike MC Grath, illustrated edition, In easy steps 2013 publishers.
5. Professional Python Frameworks: Web 2.0 Programming, Dana Moore, Raymond Budd, William Wright, Wrox Publication, ISBN: 978-0-470-13809-0, October 2007.

B.TECH II SEMESTER	**BSC**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

20AM2L06 APPLIED PHYSICS LAB

Pre-requisite: Fundamental understanding of usage of an instrument with proper care.

Course Objective: Objective of the course is to impart

- Training Engineering graduates to handle instruments and their usage methods to improve the accuracy of measurements.

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

CO1: **Outcomes**: The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

CO2: Implement the basic principles of Mechanics to measure different physical parameters.

CO3: Enhance the knowledge of Usage of electronic devices in various applications

SYLLABUS

1. Newton's rings –Determination of radius of curvature of Plano Convex Lens.
2. Determination of wavelength of spectral lines -Diffraction Grating
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of wavelength of laser source using diffraction grating
5. Determination of Numerical Aperture and bending loss of a given Optical Fiber.
6. Determination of dispersive power of prism.
7. Determination of Rigidity modulus of a material- Torsional Pendulum.
8. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
9. Determination of Young's modulus by method of single cantilever oscillations
10. Verification of laws of vibrations in stretched strings – Sonometer.

11. Estimation of Planck's Constant using Photo electric Effect
12. Study of I /V Characteristics of Semiconductor diode.
13. I/V characteristics of Zener diode.
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus
15. Energy Band gap of a Semiconductor using p - n junction diode

Reference Books

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017.

B.TECH II SEMESTER	ESC	L	T	P	C
		0	0	3	1.5

20AM2L07 DATA STRUCTURES LAB

Course Objectives:

The objective of this lab is to

- Demonstrate the different data structures implementation.

Course Outcomes:

- Use basic data structures such as arrays and linked list.
- Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths.
- Use various searching and sorting algorithms.

List of Experiments:

Exercise -1 (Searching)

a) Write C program that use both recursive and non-recursive functions to perform Linear search for a Key value in a given list.

b) Write C program that use both recursive and non-recursive functions to perform Binary search for a Key value in a given list.

Exercise -2 (Sorting-I)

a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order.

b) Write C program that implement Quick sort, to sort a given list of integers in ascending order.

c) Write C program that implement Insertion sort, to sort a given list of integers in ascending order.

Exercise -3 (Sorting-II)

a) Write C program that implement radix sort, to sort a given list of integers in ascending order

b) Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise -4 (Singly Linked List)

a) Write a C program that uses functions to create a singly linked list

b) Write a C program that uses functions to perform insertion operation on a singly linked list

c) Write a C program that uses functions to perform deletion operation on a singly linked list

d) Write a C program to reverse elements of a single linked List.

Exercise -5 (Queue)

a) Write C program that implement Queue (its operations) using arrays.

b) Write C program that implement Queue (its operations) using linked lists

Exercise -6 (Stack)

a) Write C program that implement stack (its operations) using arrays

b) Write C program that implement stack (its operations) using Linked list

c) Write C program for implementing infix to postfix conversion

d) Write a C program that uses Stack operations to evaluate postfix expression

Exercise -7 (Binary Tree)

Write a recursive C program for traversing a binary tree in preorder, in-order and post-order.

Exercise -8 (Binary Search Tree)

a) Write a C program to Create a BST

b) Write a C program to insert a node into a BST.

c) Write a C program to delete a node from a BST.

Exercise-9

Write a program for implementing Heap Sort.

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20AM2L08 PYTHON PROGRAMMING LAB

Course Objectives:

The objective of this lab is to

- To elucidate problem solving through python programming language.
- To introduce function-oriented programming paradigm through python.
- To train in development of solutions using modular concepts.
- To teach practical Python solution patterns

Course Outcomes

CO1: Develop fundamental programs in python programming language.

CO2: Develop Python programs for numerical and text-based problems.

CO3: Develop Python programs on object-oriented programming and regular expressions.

CO4: Develop python programs on data structures.

LIST OF EXPERIMENTS

1. Write a program to perform various list of operations (eg: Arithmetic, logical, bitwise etc) in python.
2. Write a program to implement control flow statements.
3. Write a program implementing various predefined function of Lists, Sets, Tuples and Dictionaries.
4. Write a program covering various arguments for a function.
5. Write a program to implement various types of functions.
6. Write a program to implement recursion.
7. Write a program to implement command line arguments.
8. Write a program to create a class and its constructors.
9. Write a program to implement inheritance.
10. Write a program for exception handling.
11. Write a program to perform various linear algebra operations like finding eigen values and vectors, determinant and trace for a matrix.

12. Write a program to perform matrix operations like addition, subtraction, multiplication of matrices using Numpy Module.
13. Write a program to use System, math etc., packages.
14. Write a Python program to find the occurrence and position of the substrings within a string.
15. Write a Python program to replace all occurrences of space, comma, or dot with a colon.
16. Write a Python program to match a string that contains only upper and lowercase letters, numbers, and underscores.