MRSPTU UNDER GRADUATE OPEN ELECTIVES-II 2016 BATCH ONWARDS
(UPDATED ON 30.08.2019)

UG OPEN ELECTIVES-II 2016 BATCH ONWARDS		
Internal	External	Total
40	60	100

NOTE: MORE COURSES MAY BE ADDED IN THIS LIST LATER ON

UG OPEN ELECTIVES-II 2016 BATCH ONWARDS		
COURSE CODE	**COURSE**	**NOT APPLICABLE FOR PROGRAMMES**
BFOT0-F92	Data Process Analysis	B.Tech. Food Technology
BBAD0-F94	Engineering Economics & Management	BBA
BBAD0-F95	Entrepreneurship	
BBAD0-F96	Finance for Engineers	
BEEE0-F94	Non-Conventional Energy Resources	B.Tech. EEE
BEEE0-F95	High Voltage Engineering	
BEEE0-F96	Nano Science and Nano Technology	
BEEE0-F97	Electrical Machines and Power Utilization	
BECE0-F94	Communication Systems	B.Tech. ECE
BECE0-F95	Robotics and Automation	
BECE0-F96	Electronic System Design	
BCIE0-F96	Building Maintenance	B.Tech. Civil Engineering
BCIE0-F97	Civil Engineering Materials	
BCIE0-F95	Fluid Mechanics	
BELE0-F94	Renewable Energy Sources	B.Tech. Electrical Engineering
BELE0-F95	Basics of Transformers	
BELE0-F96	Electrical Machines & Drives	
BMEE0-F93	Heat and Mass Transfer	B.Tech. Mechanical Engineering
BCSE0-F91	Computer Programming and Data Structure	B.Tech. CSE
BCSE0-F94	Operating Systems	
BCSE0-F95	Database Management Systems-I	
BCSE0-F96	Computer Networks-I	
BMAT0-F92	Mathematical Methods	B.Sc. (Hons. School) in Maths
BCOM1-311	Operation Research	B.Com. (Hons.)
BCOM1-313	Indian Economic Problems	

DATA PROCESS ANALYSIS

Subject Code: BFOT0-F92 **L T P C** **Duration:36 Hrs.**
3 0 0 3

UNIT-I

Introduction: The meaning of quality and quality improvement, Statistical methods for quality control and improvement.
Food Quality System: The link between quality and productivity, Quality costs, Legal aspects of quality, implementing quality improvement.
Control Charts for Variables: Statistical basis of the charts, Development and use of x and R, Charts based on standard values, Interpretation of x and R charts, The effect of non-normality on x and R charts.

UNIT-II

Sampling: Population and sampling distributions, Sampling and non-sampling errors, Mean and standard deviation of x, Shape of the sampling distribution of x, Applications of the sampling distribution of x, Population and sample proportions, Mean, standard deviation.
Test Methods: Hypothesis tests, Estimation and hypothesis testing: two populations, Chi-square tests, Analysis of Variance, Simple linear regression, Non-parametric methods.

UNIT-III

Statistical Process Control (SPC) Techniques: SPC for short production runs, Modified and acceptance control charts, SPC with auto correlated process data, Economic design of control charts.
Multivariate Process Monitoring and Control: Description of multivariate data, The Hoteling T2 control chart, The multivariate EWMA (Exponentially Weighted Moving Average) control chart, Latent structure methods.

UNIT-IV

Process Capability Analysis (PCA): PCA using probability plot, Process capability ratios, PCA using a control chart, PCA using designed experiments.
Design of Experiments and Process Optimization: Guidelines for designing experiments, Factorial experiments, the 2k factorial design, Fractional replication of the 2k design, Response surface methods and designs
Six Sigma: Introduction, Six-sigma control chart, Six-sigma quality performance.
Recommended Books:

1. Jerome D. Braverman, 'Fundamentals of Statistical Quality Control', Brady andPrentice Hall, **1981**.
2. P.S. Mann, 'Introductory Statistics', John Wiley and Sons, **2010**.
3. D.C. Montgomery, 'Statistical Quality Control', 7th Edn.,John Wiley & Sons, **2012**.
4. M. Jaya Chandra, 'Statistical Quality Control', CRC Publisher, **2001**.

ENGINEERING ECONOMICS & MANAGEMENT

Subject Code: BBAD0-F94 **L T P C** **Duration: 40 Hrs.**
3 0 0 3

Course Objectives: To run an organization, Finance and Human resources are the key factors. Theirproper utilization decides its success. This course will give the basic understanding of both

these resources.

UNIT-I (8 Hrs.)

Introduction: Scope of economics for engineers; Concept of: Goods, Utility, Value, Price, Capital, Money, Income; Law of Demand & Supply, Basic Management Principles

UNIT-II (11 Hrs.)

Cost Analysis: Cost classification: Prime cost, Overhead cost, Selling and Distribution Cost, Fixed cost, Variable cost, Implicit cost, Explicit cost, Replacement cost, Opportunity cost, Marginal cost and Sunk cost; Break Even Analysis; Economic order quantity.

Depreciation: Causes and Methods: Straight line method, Reducing balance method, Repair provision method, Annuity method, Sinking fund method, Revaluation method, Sum of the digit method.

UNIT-III (10 Hrs.)

Replacement Analysis: Reasons and factors for replacement; Determination of economic life of an asset.

Inventory Management: Introduction, Factors & Techniques.

UNIT-IV (11 Hrs.)

Human Resource Management: Definition; Functions of HRM; Process of Human Resource Planning**;** Methods of Recruitment; Meaning of Placement and Induction, Difference between Training and Development; Methods of Training and Development.

Recommended Books:

1. T.R. Jain, 'Micro Economics',V.K. Publication.
2. P. Khanna, 'Industrial Engineering and Management', Dhanpat Rai Publication Pvt. Ltd.
3. M.S. Mahajan, 'Industrial Engineering and Production Management', Dhanpat Rai & Co. Pvt. Ltd.
4. T.N. Chhabra, 'Human Resource Management', Dhanpat Rai & Co.
5. P.L. Mehta, 'Managerial Economics', Sultan Chand & Sons.

ENTERPRENEURSHIP

Subject Code: BBAD0-F95 **L T P C** **Duration: 40 Hrs.**

3 0 0 3

Course Objectives: The purpose of this paper is to prepare a ground where the students view Entrepreneurship as a desirable and feasible career option. In particular, the paper seeks to build the necessary competencies and motivation for a career in Entrepreneurship.

UNIT-I

Foundations of Entrepreneurship: Concept, Need, Definition & Role of Entrepreneurship, Definition, Characteristics & Scope of Entrepreneur, Concepts of Entrepreneur, Intrapreneur, Entrepreneurial Culture, Reasons for The Failure of Entrepreneurial Ventures, Various Case Studies, Successful, Failed and Turnaround Ventures.

UNIT-II

Women Entrepreneurs & Entrepreneurship Development: Meaning, Role, Problems & Reasons for Less Women Entrepreneurs, Role of The Following Agencies in The Entrepreneurship Development DIC, SISI,EDII &NIESBUD.

UNIT-III

Small& Medium Enterprises - Small & Medium Industry: Meaning and Importance, Role & importance of SME in India Economy, Search for a Business Idea, Source of Ideas, Idea

Processing, Selection Idea, Input Requirements, Nature and Components of SME Environment, SME Funding.

UNIT-IV

Financial Schemes Offered by Various Financial Institutions like Commercial Banks, IDBI, ICICI, SIDBI, SFCs, Role of Central Government and State Government in Promoting Entrepreneurship

Relevant case studies related to the topics should be discussed.

Recommended Books:

1. Vasant Desai, 'Management of Small Scale Industries', Himalaya Publishing.
2. Angadi, Cheema, Das, 'Entrepreneurship, Growth, and Economic Integration', Himalaya Publication.
3. Rizwana and Janakiran, 'Entrepreneurship Development', Excel Books.
4. Murthy, 'Small Scale Industry and Entrepreneurial Development', Himalaya Publishing.

FINANCE FOR ENGINEERS

Subject Code: BBAD0-F96 **L T P C** **Duration – 40 Hrs.**

3 0 0 3

Course Objectives: To provide an understanding of the function, the roles, the goals and the Processes of corporate financial management, covering the sourcing of finances and their issues in investment and operations. Problem-solving methodology will be used to illustrate the theories and tools in financial decision making.

Unit-I (10 Hrs.)

Nature, Scope and Objectives of Financial Management, Profit Maximization Vs Wealth Maximization, Financial Planning, Forms of Business Organization, Role of Financial Manager.

Unit-II (10 Hrs.)

Capital Structure – Introduction, Factors Affecting Capital Structure, Liquidity Ratios.

Capital Structure Theories: Net Income Approach, Net Operating Income Approach, Traditional Approach, Modigliani-Miller Model (MM),Criticisms of MM Models, Financial Distress & Agency Cost, Asymmetric Information Theory.

Unit-III (10 Hrs.)

Working Capital Decision: Meaning, Nature and Scope of Working Capital - Component of Working Capital – Factors affecting Working Capital, Working Capital Strategies,

Capital Budgeting Techniques: Discounted and Non-Discounted Methods (Pay Back, ARR, NPV, IRR, Benefit Cost Ratio), Long Term and Short Term Sources of Funds.

Unit-IV (10 Hrs.)

Long Term Sources of Funds: Equity share, Preference shares, Debentures, Bonds, Warrants, Venture capital and Ploughing back of profits.

Short Term Sources of Funds: Commercial Paper, Certificate of Deposit, Treasury Bills.

Financial Markets: Nature and Significance of Primary and Secondary Markets, Objectives and Functions

Course Outcomes: After completing this course the students should be able to make optimum decisions pertaining to raising funds, making investments & managing the assets of a corporation, big or small, with an ultimate goal of creating value.

Recommended Books:

1. Brigham, 'Financial Management: Text & Cases', Cengage Learning.

2. Brealy&Myres, 'Principles of Corporate Finance', Tata McGraw Hill.
3. Ambrish Gupta, 'Financial Accounting for Management', 2nd Edn., Pearson Education.
4. I.M. Pandey, 'Financial Management', Vikas Publishers.
5. S.P. Jain and K.L. Narang,'Principles of Accounting',Kalyani Publishers, New Delhi, **2004.**

NON CONVENTIONAL ENERGY RESOURCES

SubjectCode:BEEE0-F94 **L T P C** **Duration: 36 Hrs.**
3 0 0 3

Learning Objectives:

1. To understand conventional and nonconventional sources of energy.
2. To evaluate different sources of energy.
3. To persuade community to use renewable energy sources.

Learning Outcomes:

1. Students would become aware about non-conventional Energy sources and Solar energy, different types of collectors, their uses, wind energy, tidal energy, geothermal energy, Thermo Nuclear Fusion, Cold Fusion.
2. Students will develop the use of wind energy and Biomass energy
3. Students would become aware about potential of energy present under earth surface and about energy of oceanic water tides.
4. Students would develop the understanding about Nuclear energy, Hydrogen energy etc.

UNIT-I (10 Hrs.)

Introduction: Energy sources and availability, new energy techniques, Renewable energy sources

Solar Energy: Solar constant, Radiation geometry, Solar energy collectors, Concentrated and flat plate, Energy balance and collector efficiency, Solar energy storage, Application to space heating, distillation, cooking and greenhouse effect.

UNIT-II (09 Hrs.)

Wind Energy: Basic principle, site selection, Aerodynamic analysis of blades,

Bio-energy: Biomass conversion technology, photosynthesis, Biogas plant, thermal gasification

UNIT-III (10 Hrs.)

Geothermal Energy: Sources, hydrothermal sources, hot dry rock resources, geothermal fossil system, prime movers for geothermal energy

Energy from Ocean: Ocean thermal electric conversion, energy from tides, small scale hydroelectric development

UNIT-IV (07 Hrs.)

Hydrogen Energy Sources: Production, storage, utilization, magneto hydrodynamic power, thermo ionic generation, Nuclear fusion energy, Energy storage and Energy conservation.

Recommended Books:

1. G.D. Rai, 'Non-Conventional Energy Sources',Khanna Publishers, Delhi.
2. S. Rao, B.B. Parulekar, 'Energy Technology: Non-Conventional Renewable and Conventional',Khanna Publishers, Delhi.
3. H.P. Garg & Jai Prakash, 'Solar Energy: Fundamentals and Applications',Tata McGraw Hill, N. Delhi.
4. S.P.Sukhatme, 'Solar Energy: Principles of Thermal Collection and Storage',Tata McGraw Hill, N. Delhi.

5. Sutton, 'Direct Energy Conversion', McGraw Hill Inc.
6. Duffie and Beckman, 'Solar Energy Thermal Processes',John Wiley.
7. R.K. Rajput, 'Non-Conventional Energy Sources and Utilization (Energy Engineering)', S.Chand Publishers.

HIGH VOLTAGE ENGINEERING

Subject Code: BEEE0-F95 **L T P C** **Duration: 48 Hrs.**
3 0 0 3

Learning Objectives:

The course focuses to make students capable to:

1. Design a simple protection system for a section of a power system, such as a feeder, a transformer or a motor.
2. Select appropriate hardware for certain applications in power system protection and high voltage engineering.
3. Describe the principles of the generation and measurement of high voltage AC, DC and impulse voltages.

Learning Outcomes:

Students successfully completing this module will be able to:

1. To make students aware about causes of High voltage.
2. To develop the understanding about behaviour of solids, liquids and gases under the effect of high voltages.
3. To introduce the students to generation & measurement of High voltages.

UNIT-I (07 Hrs.)

Over voltages in Electric power systems, causes of over voltages and its effect on power system – Lightning, switching surges and temporary over voltages-protection against over voltages.

UNIT-II (10 Hrs.)

Electrical Breakdown in Gases, Solids and Liquids, Gaseous breakdown in uniform and non-uniform fields–corona discharges –Vacuum breakdown -conduction and breakdown in pure and commercial liquids–breakdown mechanisms in solid and composite dielectrics. Partial discharge phenomenon and its detection.

UNIT-III(09 Hrs.)

Generation of High Voltages and High Currents, Generation of High DC, AC, impulse voltages and currents. Triggering and control of impulse generators.

UNIT-IV(10 Hrs.)

Measurement of High Voltages and High Currents, Measurement of High voltages and High currents – Digital techniques in high voltage measurement. High Voltage Testing & Insulation Coordination, High voltage testing of electrical power apparatus – power frequency, impulse voltage and DC testing–International and Indian standards.

Recommended Books:

1. M.S. Naidu and V. Kamaraju, 'High Voltage Engineering', Tata McGraw Hill, **2004**.
2. E. Kuffeland, W.S. Zaengl, 'High Voltage Engineering Fundamentals', Pergamon Press, Oxford, London.
3. C.L.Wadhwa,'High Voltage Engineering', New Age International Pvt. Ltd.

NANO-SCIENCE AND NANO-TECHNOLOGY

Subject Code: BEEE0-F96 **L T P C** **Duration: 36 Hrs.**

3 0 0 3

Learning Objectives:

1. To create awareness about nanotechnology issues.
2. To create awareness about Quantum computing.

Learning Outcomes: Students shall be able to

1. Understand the fundamentals and basics of nanotechnology.
2. Understand significance and potential opportunities to create better materials and products.

UNIT-I (07 Hrs.)

Introduction to the Practice and Discipline of Nanotechnology: The nano scale dimension and paradigm, Definitions, history and current practice, Overview of current industry applications, Nano scale science and engineering principles

UNIT-II (10 Hrs.)

Physical Basis and Principles of Nanotechnology: Overview of chemistry fundamentals for nanotechnology, engineering principles for nanotechnology materials and applications, Self–assembly and overview of Complex Adaptive Systems (CAS).

Semiconductors: Moore's Law, history 1950–2025, Materials requirements for silicon, Quantum effects – desired or not, Beyond Moore, Nanofabrication techniques in semiconductors

UNIT-III (10 Hrs.)

Quantum Computing: Basic physics and Moore's Law, Quantum devices – e.g. quantum dots

Future requirements for development in nanotechnology: Electron Transport at nano–meter scale, Molecular manufacturing, Self–assembly and 'bottom–up' manufacturing, Organic molecules and supramolecular chemistry, Current practice – applications in nano–bio, Drexler–Smalley debate – realistic projections.

UNIT-IV (09 Hrs.)

Carbon Nanotube Technologies (CNT): CNT, Carbon nanotube applications and MWNT, Fabricating carbon nanotubes and nano–wall structures, Key applications of CNT and MWNT

Nanomaterials in consumer market: Electronics, photonics, nano–opto, NEMS, Thin Film applications, Computing technologies – present and future, Nano medicine.

Recommended Books:

1. Mark Ratner, Daniel Ratner, ‘Nanotechnology: A Gentle Introduction to Next Big Idea’, Prentice Hall.
2. Linda Williams, Wade Adams, ‘Nano Technology De Mystified–A Self Teaching Guide’,McGraw Professional.
3. Gabor L. Hornyak, John J. Moore, H.F. Tibbals, Joydeep Dutta, ‘Fundamentals of Nanotechnology’,Taylor and Francis.
4. ManasiKarkare, ‘Nano Technology: Fundamentals and Applications’, I. K. International Pvt.Ltd.

ELECTRICAL MACHINES AND POWER UTILIZATION

Subject Code: BEEE0-F97 **L T P C** **Duration: 36 Hrs.**
3 0 0 3

Course Objectives:
To study different electrical power machines and their use in various applications in agricultural operations.

Course Outcomes:
Students will be able to acquire knowledge about:
1. Different types of circuits and their applications.
2. Principles and operation of transformers, DC machines and motors.
3. Various methods of power measurement.

Unit – I (10 Hrs.)

Electro motive force, reluctance, laws of magnetic circuits, determination of ampere-turns for series and parallel magnetic circuits, hysteresis and eddy current losses; Transformer- principle of working, construction of single phase transformer, EMF equation, phasor diagram on load.

Unit – II (12 Hrs.)

Leakage reactance, transformer on load, equivalent circuit, voltage regulation, power and energy efficiency, open circuit and short circuit tests, principles, operation and performance of DC machine (generator and motor), EMF and torque equations, armature reaction, commutation, excitation of DC generator and their characteristics.

Unit – III (12 Hrs.)

D.C. motor characteristics, starting of shunt and series motor, starters, speed control methods-field and armature control, poly-phase induction motor: construction, operation, equivalent circuit, phasor diagram, effect of rotor resistance, torque equation, starting and speed control methods.

Unit – IV (10 Hrs.)

Single Phase Induction Motor: Double field revolving theory, equivalent circuit, characteristics, phase split, shaded pole motors, disadvantage of low power factor and power factor improvement, various methods of single and three phase power measurement.

Recommended Books & References:
1. P.S. Bimbhra, 'Electrical Machinery', Khanna Publishers, New Delhi, **1991**.
2. H. Cotton, 'Advanced Electrical Technology', 7thEdn., Wheeler Publishing**, 1999.**
3. Nagrath, Kothari, 'Electric Machines', Tata McGraw Hill Publishing Company, New Delhi, **2010.**
4. A.K. Theraja and B.L. Theraja, 'A Textbook of Electrical Technology', Vol.-1, S. Chand Publisher, **2014.**

COMMUNICATION SYSTEMS

Subject Code: BECE0-F94 **L T P C** **Duration: 37 Hrs.**
3 0 0 3

Learning Objectives:
1. To understand the basic concept of communication and amplitude modulation.

2. To understand the concept of angle modulation.
3. To understand theory of digital modulation.
4. To understand working of radio receivers.

Learning Outcomes:

At the end of the Course the student shall be able to:

1. Understand the fundamentals of communication systems and to perform amplitude and angle modulation and demodulation of analog signals
2. Perform and analyze PAM, PCM and PWM
3. Analyze FDM and TDM systems.
4. Design and conduct experiments, using modern communication tools necessary for various engineering applications.

UNIT-I

Introduction: Basic elements of communications. Noise Modulation and frequency translation, Need for modulation.

Amplitude Modulation (AM): Expression for AM, modulation index for AM, amplitude waveform and bandwidth of amplitude modulated signal, power distribution in amplitude modulated signal. Double sideband suppressed carrier (DSB-SC), single sideband (SSB), and vestigial sideband (VSB) AMs.

AM Modulators: Introduction. Circuit diagrams and operational principles of square law modulator, switching modulator, balanced modulator, ring modulator.

AM Demodulators: Introduction. Circuit diagrams and explanations of envelope detector and square law detector.]

UNIT-II

Angle Modulation: Introduction to Phase modulation (PM) and frequency modulation (FM). Relationship between PM and FM. Phase and frequency deviation. Power distribution in angle modulated signal. Spectral characteristics of angle modulated signals. Effect of noise on angle modulation, role of limiter, pre-emphasis and de-emphasis in FM. Comparison of FM with AM in communication systems.

UNIT-III

Introduction to Digital Signals: Comparison of Analog and Digital Signals; Advantages and disadvantages of Digital Communications, Elements of Digital Communication Systems. Pulse Amplitude Modulation, Pulse Code Modulation (PCM); Quantization Noise, Commanding Sampling Theorem, Concept of aliasing & flat top sampling, PCM bandwidth, Differential PCM, Delta Modulation(DM), Pulse width Modulation(PWM), Adaptive Delta Modulation(ADM).

UNIT-IV

Line Coding Schemes: Introduction, properties, general methods for derivation of power spectral density of a broad class of line coding scheme: ON-OFF signaling, polar signaling, bipolar and comparison among them. Pulse shaping, introduction to equalizer and eye diagram.

Recommended Books:

1. Taub and Schilling, ‘Principles of Communication Systems’, McGraw Hill.
2. G. Kennedy, ‘Electronic Communication System’, PHI.
3. Roddy and Coolen, ‘Electronic Communications’, PHI
4. ThiagrajanVishwanathan, ‘Communication Switching Systems and Networks’, PHI Pub.
5. Proakis, ‘Communication System Engineering’, Pearson.

ROBOTICS AND AUTOMATION

Subject Code: BECE0-F95 **L T P C** **Duration: 36 Hrs.**
3 0 0 3

Learning Objectives:
The student should be made to:
1. Learn the fundamentals of robotics and robot kinematics
2. Be familiar with robot dynamic analysis and forces
3. Learn about the concepts of actuators and sensors.
4. Learn robot programing and applications.

Learning Outcomes:
Upon completion of the Course, the student should be able to:
1. Apply various robot kinematics.
2. Analyse the robot dynamic, differential motions and inverse manipulator kinematics.
3. Understand methods of trajectory planning, actuators and sensors.
4. Understand the lead through programming methods.

UNIT-I

Fundamentals: historical information, robot components, Robot characteristics, Robot anatomy, Basic structure of robots, Resolution, Accuracy and repeatability

Robot Kinematics: Position Analysis forward and inverse kinematics of robots, Including frame representations, Transformations, position and orientation analysis and the DenavitHartenberg representation of robot kinematics, The manipulators, The wrist motion and grippers.

UNIT-II

Differential motions, Inverse Manipulator Kinematics: Differential motions and velocity analysis of robots and frames.

Robot Dynamic Analysis and Forces: Analysis of robot dynamics and forces, Lagrangian mechanics is used as the primary method of analysis and development.

UNIT-III

Trajectory Planning: Methods of path and trajectory planning, both in joint space and in Cartesian space.

Actuators and Sensors: Actuators, including hydraulic devices, Electric motors such as DC servomotors and stepper motors, Pneumatic devices, as well as many other novel actuators, It also covers microprocessor control of these actuators, Mechatronics, Tactile sensors, Proximity and range sensors, Force and torque sensors, Uses of sensors in robotics.

UNIT-IV

Robot Programming, Systems and Applications: Robot languages, Method of robots programming, Lead through programming methods, A robot programs as a path in space, Motion interpolation, WAIT, SIGNAL and DELAY commands, Branching capabilities and limitation of lead through methods and robotic applications.

Recommended Books:
1. Stauguard A.C. & Eagle wood clif, 'Robotic & AI', Prentice Hall.
2. Lee C.S.G., Fu K.S., Gonzalez R.C, 'Robotic control, Sensing and Intelligence', Mcgraw Hill.
3. Parent M. and Laugreau C, 'Robot Technology, Logic 7 Programming', Kogan Page, London.

ELECTRONIC SYSTEM DESIGN

Subject Code: BECE0-F96 **L T P C** **Duration: 38 Hrs.**
3 0 0 3

Learning Objectives:

1. To understand the stages of product (hardware/ software) design and development.
2. To learn the different considerations of analog, digital and mixed circuit design.
3. To understand the importance of sinusoidal oscillators. `
4. To understand the constant current sources.

Learning Outcomes:

1. After successfully completing the Course students will be able to:
2. Understand various stages of hardware, software in electronic system design.
3. Designing of Class, A, AB, Audio power amplifier.
4. Special design considerations of filters.

UNIT-I

Design of Power Supply System: Unregulated D.C. power supply system with rectifiers and filters. Design of emitter follower regulator, series regulators, overload protection circuits for regulators. Design of SMPS: Step up and step down.

UNIT-II

Design of Class A Small Signal Amplifiers: Emitter follower, Darlington pair amplifiers with and without Bootstrapping, Two stage direct coupled amplifier. Design of class A, Class AB audio power amplifier with drivers.

UNIT-III

Design of Sinusoidal Oscillators: OPAMP based Wein bridge and Phase Shift oscillators with AGC circuits, Transistor based Hartley, Colpits and Crystal oscillators, Evaluation of figure of merit for all above oscillator circuits.

UNIT-IV

Design of Constant Current Sources, Design of function generators, Design of tuned amplifiers. Design of Butterworth, Chebyshev filters up to sixth order with VCVS and IGMF configuration.

Recommended Books:

1. Anielo. ‘Electronics: BJT’s, FETS and Microcircuits’.
2. Goyal&Khetan, ‘Monograph on Electronic Circuit Design’.
3. ‘Regulated Power Supply Handbook’, Texas Instruments.

BUILDING MAINTENANCE

Subject Code: BCIE0-F96 **L T P C** **Duration: 36 Hrs.**
3 0 0 3

UNIT-I

Importance of Maintenance, Deterioration and Durability: Factors affecting decision to carryout maintenance, agencies causing deterioration, effect of deterioration agencies on materials. Factors to reduce maintenance at design stage, consideration of maintenance aspects in preparing tender document and specifications, sources of error in design which enhances

maintenance, importance of working drawings and schedules, provision of access for maintenance and its importance at design stage. Economic consideration in maintenance: physical life, functional life, economic life of different types of buildings, discounting technique for assessment of economic life.

UNIT-II

Maintenance Management: Definition, organization structure, work force for maintenance, communication needs, building inspections, maintenance budget and estimates, property inspections and reports, specification for maintenance jobs, health and safety in maintenance, quality in maintenance, maintenance manual and their importance.

Materials for Maintenance: Compatibility of repair materials, durability and maintenance, types of materials, their specification and application, criteria for selection of material, use of commercial available materials in maintenance.

UNIT-III

Investigation and Diagnosis for Repair of Structures: Basic approach to investigations, physical inspection, material tests, non-destructive testing for diagnosis, estimation of actual loads and environmental effects, study of design and construction practices used in original construction, retrospective analysis and repair steps. Maintenance Problems and Root Causes: Classification of defects, need for diagnosis, type of defects in building elements and building materials defect location, symptoms and causes.

UNIT-IV

Remedial Measures for Building Defects: Preventive maintenance and special precautions - considerations, preventive maintenance for floors, joints, wet areas, water supply and sanitary systems, termite control, common repair techniques, common methods of crack repair.

1. Repair of existing damp proofing systems in roofs, floors and wet areas.
2. Protection, repair and maintenance of RCC elements.
3. Repair, maintenance of foundations, basements and DPC
4. Repair of finishes.
5. Repair of building joints.
6. Repair of water supply and sanitary systems, underground and overhead tanks.
7. Common strengthening techniques
8. Maintenance of Industrial Floors

Maintenance of Multi-Storey Buildings: Specials features for maintenance of multi-storey buildings, including fire protection system, elevators booster pumps, generator sets.

Recommended Books:

1. A.C. Panchdari, 'Maintenance of Buildings', New Age International (P) Limited Publishers.

CIVIL ENGINEERING MATERIALS

Subject Code: BCIE0-F97 **L T P C** **Duration:36 Hrs.**

3 0 0 3

UNIT-I

STONES – BRICKS – CONCRETE BLOCKS: Stone as building material – Criteria for selection Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for special use – Refractory bricks – Cement, Concrete blocks – Light, weight concrete blocks.

UNIT-II

LIME – CEMENT – AGGREGATES – MORTAR: Lime – Preparation of lime mortar – Cement – Ingredients – Manufacturing process – Types and Grades – Properties of cement and Cement mortar – Hydration – Compressive strength – Tensile strength – Fineness– Soundness and consistency – Setting time – Industrial byproducts – Fly ash – Aggregates – Natural stone aggregates – Crushing strength – Impact strength – Flakiness Index – Elongation Index – Abrasion Resistance – Grading – Sand Bulking.

UNIT-III

CONCRETE: Concrete – Ingredients – Manufacturing Process – Batching plants – RMC – Properties of fresh concrete – Slump – Flow and compaction Factor – Properties of hardened concrete – Compressive, Tensile and shear strength – Modulus of rupture – Tests – Mix specification – Mix proportioning – BIS method – High Strength Concrete and HPC – Self compacting Concrete – Other types of Concrete – Durability of Concrete.

UNIT-IV

TIMBER AND OTHER MATERIALS: Timber – Market forms – Industrial timber– Plywood – Veneer – Thermacole – Panels of laminates – Steel – Aluminum and Other Metallic Materials – Composition – Aluminium composite panel – Uses – Market forms – Mechanical treatment – Paints – Varnishes – Distempers – Bitumens.

MODERN MATERIALS: Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles – Geomembranes and Geotextiles for earth reinforcement.

Recommended Books:

1. P.C. Varghese, 'Building Materials', PHI Learning Pvt. Ltd, New Delhi, **2012**.
2. R.K. Rajput, 'Engineering Materials', S. Chand and Company Ltd., **2008**.
3. M.S. Shetty, 'Concrete Technology (Theory and Practice)', S. Chand and Company Ltd.,**2008**.
4. M.L.Gambhir, 'Concrete Technology', 3rdEdn., Tata McGraw Hill Education, **2004.**
5. S.K. Duggal, 'Building Materials', 4thEdn., New Age International, **2008**.

Reference Books:

1. K.S. Jagadish, 'Alternative Building Materials Technology', New Age International, **2007**.
2. M.L.Gambhir& Neha Jamwal, 'Building Materials, Products, Properties and Systems', Tata McGraw Hill Educations Pvt. Ltd, New Delhi, **2012**.
3. IS456 – 2000: Indian Standard Specification for Plain and Reinforced Concrete, **2011.**
4. IS4926–2003: Indian Standard Specification for Ready–Mixed Concrete, **2012.**
5. IS383–1970: Indian Standard Specification for Coarse and Fine Aggregate from Natural Sources for Concrete, 2011 6. IS1542–1992: Indian Standard Specification for Sand for Plaster, **2009.**

FLUID MECHANICS

Subject Code: BCIE0-F95 **L T P C** **Duration:36 Hrs.**

3 0 0 3

Course Objectives:

To provide the fundamental knowledge of fluid, its properties and behavior under various conditions of internal and external flows.

Course Outcomes:

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

1. State the Newton's law of viscosity and explain the mechanics of fluids at rest and in motion by observing the fluid phenomena.
2. Examine energy losses in pipe transitions and sketch energy gradient lines.
3. Examine the possibility of a flow using continuity equation.
4. Understand the concept of rotational, irrigational flows; stream functions, velocity potentials. Laplace equation etc.

Unit – I (12 Hrs.)

Fluid and their Properties: Concept of fluid, difference between solids, liquids and gases; ideal and real fluids; Continuum concept of fluid: density, specific weight and relative density; viscosity and its dependence on temperature; surface tension and capillarity, vapor pressure and cavitations; Newtonian and non-Newtonian fluids. Rotational flows- Rotational velocity and circulation.

Unit - II (10 Hrs.)

Kinematics of Fluid Flow: continuity equation, path lines, streak lines and streamlines, stream tube, stream function, velocity potential function, and flow net. Types of fluid flow, translation, rotation, circulation and vorticity, Vortex motion; Dynamics of fluid flow, Bernoulli's theorem, venturimeter, orifice-meter, Introduction to orifice and notch.

Unit - III (10 Hrs.)

Laminar Flow: shear stress distribution and velocity distribution in circular pipes and two parallel plates; kinetic energy correction factor and momentum energy correction factor, average velocity, shear stress and pressure gradient; Turbulent flow in pipes, Darcy equation

Unit - IV (8 Hrs.)

Dimensional Analysis and Similitude: Rayleigh's method and Buckingham's π-theorem, types of similarities, dimensionless numbers, model's law.

Recommended Books & References:

1. R.K. Bansal, 'A Textbook of Fluid Mechanics', 1st Edn., Laxmi Publications,**2016.**
2. YunusCengel, 'Fluid Mechanics in SI Units'**,** McGraw Hill Education, 3rd Edn.,**2017.**
3. Biswas, 'Introduction to Fluid Mechanics and Fluid Machines', 3rd Edn., McGraw Higher Education, **2011.**

RENEWABLE ENERGY SOURCES

Subject Code: BELE0-F94 **L T P C** **Duration:36 Hrs.**
3 0 0 3

Course Objectives:

1. To obtain knowledge about renewable energy sources and solar energy and their utilization.
2. To introduce to wind energy conversion and bio-mass energy conversion systems.
3. To introduce to geothermal energy and energy from ocean. To make them aware about hydrogen energy sources.

Course Outcomes:

1. Students will get knowledge about utilization of renewable energy sources and solar energy.
2. They will learn about wind energy conversion and bio-mass energy conversion systems.
3. They will become aware about geothermal energy, energy from ocean and hydrogen energy sources.

UNIT-I (13 Hrs.)

Solar Energy: Conventional energy sources and availability, Introduction to new energy techniques& renewable energy sources; Solar Energy, Solar constant, Radiation geometry, Solar

energy collectors, Concentrated and flat plate, Energy balance and collector efficiency, Solar energy storage, Application to space heating, distillation, cooking and greenhouse effect.

UNIT-II (12 Hrs.)

Wind and Bio-Energy: Basic principle of wind energy conversion, site selection, analysis of aerodynamic forces acting on wind mill blades and estimation of power output, Biomass conversion technology, photosynthesis, biogas plant, thermal gasification.

UNIT-III (10 Hrs.)

Geothermal Energy: Sources- hydrothermal, hot dry rock, geothermal fossil system, prime movers for geothermal energy.

Energy from Ocean: Ocean thermal electric conversion, energy from tides, small-scale hydroelectric development.

UNIT-IV (10 Hrs.)

Hydrogen Energy Sources: Introduction, hydrogen production methods, storage, utilization, magneto hydrodynamic power, thermionic generation, nuclear fusion energy.

Recommended Books:

1. G.D. Rai, 'Non-Conventional Energy Sources', Khanna Publishers, Delhi, **2011**.
2. S. Rao, B.B.Parulekar, 'Energy Technology: Non-Conventional Renewable and Conventional', Khanna Publishers, Delhi,
3. H.P. Garg and Jai Prakash, 'Solar Energy: Fundamentals and Applications', Tata McGraw Hill.
4. Saeed S. Hasan and D.K. Sharma, 'Non-Conventional Energy Resources', Katson Publishers, **2014**.
5. R.K. Rajput, 'Non-Conventional Energy Sources and Utilization', S. Chand Publishers, **2012**.
6. S.P.Sukhatme, 'Solar Energy: Principles of Thermal Collection and Storage', Tata McGraw Hill, N. Delhi, **1984**.

BASICS OF TRANSFORMERS

Subject Code: BELE0-F95 **L T P C** **Duration:36 Hrs.**
3 0 0 3

Course Objectives:

1. To aware the students about the basics of Transformer.
2. To provide basic concepts of different types of transformer connections and their applications.
3. To impart knowledge of single phase transformer, auto transformer and three phase transformer.

Course Outcomes:

1. Students will become familiar with different types of transformers.
2. Students will get Knowledge of different types of insulating materials used in transformers.
3. Students will get knowledge of applications of different types of transformer.

UNIT-I (13 Hrs.)

Single Phase Transformer: Construction, working principle of operation, E.M.F. equation, phasor diagram under loaded and unloaded condition, rating of transformers, losses in transformer, transformer testing, open and short circuit tests, voltage regulation and efficiency, condition for maximum efficiency,applications of transformers.

UNIT-II (10 Hrs.)

Auto-Transformers: Construction, working principle of operation, phasor diagram, saving of conductor material, comparison of auto transformer and two winding transformer, advantages, disadvantages and applications.

UNIT-III (12 Hrs.)

Three Phase Transformer: Three winding transformer, construction of three phase transformer, three phase transformer connections: Star-star connection, delta-delta connection, delta-star connection, star-delta connection, phasor groups, three phase to two phase and six phase conversion, scott connection three phase to two phase conversion, phase shifting from primary to secondary windings.

UNIT-IV (10 Hrs.)

Transformer Materials: Different types of insulting material for transformer core, winding, insulation, need for bushings, various cooling techniques, effect of temperature on the performance of transformer.

Recommended Books:

1. P.S. Bhimbra, 'Electrical Machinery',7thEdn., Khanna Publishers, Delhi,**2004**
2. A.E. Fitzerald, C. Kingsley and S.D. Umans, 'Electric Machinery', 6thEdn., TMH, **2002.**
3. A.S. Langsdorf, 'Theory of AC Machinery', 2ndEdn., Tata McGraw Hill,**1955.**
4. AshfaqHussian, 'Electrical Machines', 2ndEdn., Dhanpat Rai and Company, **2002**.
5. S.J. Chapman, 'Electrical Machinery Fundamentals', 2ndEdn., McGraw Hill, New York,**1991.**

ELECTRICAL MACHINES & DRIVES

Subject Code: BELE0-F96 **L T P C** **Duration:36 Hrs.**
3 0 0 3

Course Objectives:

1. To make the students aware about the basics and need for energy efficient machines.
2. To make them familiar with the energy efficient motors and their applications.
3. To make them to understand the drive systems.

Course Outcomes:

1. The students will become aware about the need for energy efficient machines.
2. They will come to know about the energy efficient motors and their applications.
3. They will understand the adjustable speed systems.

UNIT-I (13 Hrs.)

Energy Efficient Motors: Review of induction motor characteristics, Standard motor efficiency, energy efficient motor, efficiency determination methods, Direct Measurement method, Loss segregation method, Comparison, motor efficiency labeling, energy efficient motor standards.

UNIT-II (10 Hrs.)

Power Factor: The power factor in sinusoidal systems, power factor improvement, power factor with nonlinear loads, Harmonics and power factor.

UNIT-III (12 Hrs.)

Application of Electric Motors: Varying duty applications, Voltage variation, Voltage Unbalance, over motoring, Poly-phase induction motors supplied by adjustable frequency power supplies.

UNIT-IV (10 Hrs.)

Induction Motors and Adjustable Drive Systems: Energy Conservation, adjustable speed systems, Application of adjustable speed systems to fans, pumps and constant torque loads.

Recommended Books:

1. Andreas John C., 'Energy Efficient Electric Motors', CRC Press, **1992**.
2. Emadi Ali, 'Energy Efficient Electric Motors', 3rd Edn.,CRC Press, **2004**.
3. Thuman Albert, 'Introduction to Efficient Electric Systems Design', The Fairmount Press Prentice Hall, **1991.**
4. S.C.Tripathi, 'Electric Energy Utilization and Conservation', Tata McGraw Hill, **1991**.
5. Charles Belove, 'Handbook of Modern Electronics and Electrical Engineering', JohnWiley and Sons, **1986**.

HEAT AND MASS TRANSFER

Subject Code: BMEE0-F93 **L T P C** **Duration:36 Hrs.**
3 0 0 3

Course Objectives:

The course provides an introduction to heat and mass transfer and introduces practical application in industry. Basic tools to design process operations involving heat transfer and mass transfer are covered.

Course Outcomes:

After learning the Course, the students should be able to:

1. Understand basic concept of heat transfer.
2. To understand the concepts of heat transfer through extended surfaces.
3. Able to do basic calculations involving heat transfer as is typical for a engineer, this includes conduction, convection and radiation heat transfer as well as heat exchanger design.
4. Apply scientific and engineering principles to analyze and design aspects of engineering systems that relate to conduction, convection and radiation heat transfer.

Unit - I (8 Hrs.)

Introductory concepts, modes of heat transfer, thermal conductivity of materials, measurement. General differential equation of conduction; One dimensional steady state conduction through plane and composite walls, tubes and spheres with and without heat generation, Electrical analogy.

Unit - II (10 Hrs.)

Insulation materials, critical thickness of insulation, Fins, Free and forced convection; Newton's law of cooling, heat transfer coefficient in convection; Dimensional analysis of free and forced convection; Useful non dimensional numbers and empirical relationships for free and forced convection.

Unit - III (10 Hrs.)

Equation of laminar boundary layer on flat plate and in a tube, Laminar forced convection on a flat plate and in a tube; combined free and forced convection. Introduction- Absorptivity, reflectivity and transmissivity of radiation; Black body and monochromatic radiation, Planck's law, Stefan-Boltzman law, Kirchoff's law, grey bodies and emissive power, solid angle, intensity of radiation.

Unit - IV (12 Hrs.)

Heat transfer analysis involving conduction, convection and radiation by networks, Types of heat exchangers, fouling factor, log mean temperature difference, heat exchanger performance, transfer units. Heat exchanger analysis restricted to parallel and counter flow heat exchangers.

Steady state molecular diffusion in fluids at rest and in laminar flow, Flick's law, mass transfer coefficients. Reynold's analogy.

Recommended Books & References:

1. R.K. Rajput, 'Heat and Mass Transfer', S.Chand Publication,**2008.**
2. P.K. Nag, 'Heat & Mass Transfer', McGraw Hill,**2011.**
3. YunusCengel, 'Heat and Mass Transfer Fundamentals and Applications', McGraw Hill**, 2017.**
4. Incropera and Dewitt, 'Fundamental of Heat and Mass Transfer', Wiley Publication.
5. Mills and Ganesan, 'Heat Transfer', Pearson Education.

COMPUTER PROGRAMMING AND DATA STRUCTURES

Subject Code: BCSE0-F91 **L T P C** **Duration: 40 Hrs.**
3 0 0 3

Course Objectives:

The objective of this course is to make students to learn basic principles of Problem solving, implementing through C programming language and to design & develop programming skills and to gain knowledge of data structures and their applications.

Course Outcomes:

On completion of this course, students are able to:

1. Design and develop modular programming skills.
2. Effective utilization of memory using pointer technology
3. Understands the basic concepts of pointers and data structures.

Unit – I (8 Hrs.)

Introduction to high level languages, Primary data types and user defined data types, Variables, type casting, Operators, Building and evaluating expressions, Standard library functions, Managing input and output.

Unit – II (12 Hrs.)

Decision making, Branching, Looping, Arrays and User defined functions, passing arguments and returning values, recursion, scope and visibility of a variable, String functions, Structures and union, Pointers, Stacks, Push/Pop operations, Queues, Insertion and deletion operations, Linked lists.

Unit – III (10 Hrs.)

Familiarizing with Turbo C IDE; Building an executable version of C program; Creating programs using decision making statements such as if, go to & switch; Developing program using loop statements while, do & for; Using nested control structures.

Unit – IV (10 Hrs.)

Familiarizing with one and two dimensional arrays; Using string functions; developing structures and union; Creating user defined functions; Using local, global & external variables; Insertion/Deletion in data structures.

Recommended Books & References:

1. A.S. Tanenbaum, Y. Langsam, and M.J. Augenstein, 'Data Structures Using C', PHI/Pearson Education.
2. Ashok N. Kamthane, 'Programming and Data Structures,Pearson Publisher, **2009.**
3. B.A. Forouzan and R.F. Gilberg, 'C Programming & Data Structures', 3rdEdn., Cengage Publisher.

4. Dharmender S. Kushwaha, A.K. Mishra,'Data Structures: A Programming Approach with C', PHI Learning Publisher, **2014.**

OPERATING SYSTEMS

Subject Code- BCSE0-F94 **L T P C** **Duration – 45 hrs**
3 0 0 3

COURSE OBJECTIVE

To understand the services and design of Operating Systems. To understand the organization of file systems and process scheduling and memory management

COURSE OUTCOMES

CO1 Understanding operating system functions, Role of operating system, different structures and views of Operating system.
CO2 Process management CPU scheduling, Scheduling Algorithms, PCB, Process synchronization, Deadlocks, Prevention, Detection and Recovery.
CO3 Memory Management Overlays, Memory management policies, Fragmentation and its types, Portioned memory managements, Paging, Segmentation, Ned of Virtual memories, Page replacement Algorithms, Concept of Thrashing.
CO4 Device Management, I/O system and secondary storage structure, Device management policies, Role of I/O traffic controller File Management File System Architecture, Layered Architecture, Physical and Logical File Systems, Protection and Security. Brief study to multiprocessor and distributed operating systems.

COURSE CONTENT

UNIT-I (11 hrs)

Introductory Concepts: Operating System functions and characteristics, historical evolution of operating systems, Real time systems, Distributed systems, Methodologies for implementation of O/S service, system calls, system programs, interrupt mechanisms.
Processes: Processes model, process states, process hierarchies, implementation of processes, data structures used such as process table, PCB creation of processes, context switching, exit of processes. Interprocess communication: Race conditions, critical sections, problems of mutual exclusion, Peterson's solution, producer-consumer problem, semaphores, counters, monitors, message passing.

UNIT-II (12 hrs)

Process scheduling: objective, preemptive vs non- preemptive scheduling, comparative assessment of different algorithms such as round robin, priority bases scheduling, FCFS, SJF, multiple queues with feedback.
Deadlocks: conditions, modeling, detection and recovery, deadlock avoidance, deadlock prevention.
Memory Management: Multiprogramming with fixed partition, variable partitions, virtual partitions, virtual memory, paging, demand paging design and implementation issues in paging such as page tables, inverted page tables, page replacement algorithms, page fault handling, working set model, local vs global allocation, page size, segmentation and paging.

UNIT-III (11 hrs)

File Systems: File type, attributes, access and security, file operations, directory structures, path names, directory operations, implementation of file systems, implementation of file and file

operations calls, implementation of directories, sharing of files, disk space management, block allocation, free space management, logical file system, physical file system.

UNIT-IV (11 hrs)

Device Management: Techniques for device management.

Case Studies: LINUX / UNIX Operating System and Windows based operating systems. Recent trends in operating system

NOTE: This Subject is common to all branches. Only Introduction of the concepts is given to the students.

RECOMMENDED BOOKS

1. Peterson J L & Silberschatz , 'Operating System concepts', 4th Ed., Addison Wesley, **1994**.
2. Brinch, Hansen, 'Operating System Principles', PHI, **2001**.
3. Tenanbaum A S, 'Operating System', PHI.
4. Dhamdhere, 'Systems Programming & Operating Systems', Tata McGraw-Hill Education, **1999**.
5. GaryNutt, 'Operating Systems Concepts', 3rd Ed., Pearson/Addison Wesley, **2004**.
6. William Stallings, 'Operating System', 5th Ed., Pearson Education India, **2005**.

DATABASE MANAGEMENT SYSTEMS-I

Subject Code- BCSE0-F95 **L T P C** **3 0 0 3** **Duration – 45 hrs**

COURSE OBJECTIVE

To familiarize the students with Data Base Management system

COURSE OUTCOME

CO1 To provide introduction to database systems and various models.
CO2 To provide introduction to relational model and SQL
CO3 To understand about Query Processing and Transaction Processing.
CO4 To learn the concept of failure recovery and concurrency control

COURSE CONTENT

UNIT-I (11 hrs)

Introduction to Database Systems: File Systems Versus a DBMS, Advantages of a DBMS, Describing and Storing Data in a DBMS, Database System Architecture, DBMS Layers, Data independence.

Data Models: Relational Model, Network Model, Hierarchical Model, ER Model: Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Database Design with the ER Model, Comparison of Models.

UNIT-II (12 hrs)

The Relational Model: Introduction to the Relational Model, ER to Relational Model Conversion, Integrity Constraints over Relations, Enforcing Integrity Constraints, Relational Algebra, Relational Calculus, Querying Relational Data

Relational Query Languages: SQL: Basic SQL Query, Creating Table and Views, SQL as DML, DDL and DCL, SQL Algebraic Operations, Nested Queries, Aggregate Operations, Integrity Constraints in SQL.

UNIT-III (11 hrs)

Database Design: Functional Dependencies, Reasoning about Functional Dependencies, Normal Forms, Schema Refinement, 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, Domain Key Normal Forms.

Transaction and Concurrency Management: ACID Properties, Serializability, Two-phase Commit Protocol, 2PL protocol, Lost Update Problem, Inconsistent Read Problem. Concurrency Control, Lock Management, Read-Write Locks, Deadlocks Handling.

UNIT-IV (11 hrs)

Physical Data Organization: File Organization and Indexing,

Database Protection: Threats, Access Control Mechanisms: Discretionary Access Control, Mandatory Access Control, Grant and Revoke.

NOTE: This Subject is common to all branches. Only Introduction of the concepts is given to the students.

RECOMMENDED BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 'Database System Concepts', 6th Ed., Tata McGraw-Hill, **2011**.
2. RamezElmasri, ShamkantNavathe, 'Fundamentals of Database Systems', 5th Ed., Pearson Education, **2010**.
3. C.J. Date, 'An Introduction to Database Systems', Pearson Education, 8th Ed., **2006**.
4. Alexis Leon, Mathews Leon, 'Database Management Systems', Leon Press, 1st Ed., **2008**
5. S. K. Singh, 'Database Systems Concepts, Design and Applications', 2nd Ed., Pearson Education, **2011**.
6. Raghu Ramakrishnan, Johannes Gehrke, 'Database Management Systems', 3rd Ed., Tata McGraw-Hill, **2014**

COMPUTER NETWORKS-I

Subject Code- BCSE0-F96 **L T P C** **Duration – 45 hrs**
3 0 0 3

COURSE OBJECTIVES

This course introduces students to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks. It is based around the OSI Reference Model which deals with the major issues in the bottom four (Physical, Data Link, Network and Transport) layers of the model. They are also introduced to the areas of Network Security and Mobile Communications.

COURSE OUTCOMES

CO1 to provide knowledge about various types of networking, networks and network topologies. Also acquire knowledge about concepts of OSI reference model and real world protocol suite such as TCP/IP.

CO2 Outline the basic network configurations, various Multiplexing and Switching Techniques.

CO3 Analyse, specify and design the Addressing Schemes and routing strategies for an IP based networking infrastructure
CO4 Operations of TCP/UDP, FTP, HTTP, SMTP, SNMP and Security and protection issues etc.

COURSE CONTENTS

UNIT-1 (11 hrs)

Introduction to Computer Networks: Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.

UNIT-II (12 hrs)

Physical Layer: Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise, Data rate limits: Nyquist formula, Shannon Formula, multiplexing: Frequency Division, Time Division, Wavelength Division, Introduction to Transmission Media: Twisted pair, Coaxial cable, Fiber optics, Wireless transmission (radio, microwave, infrared), Switching: Circuit Switching, Message Switching, Packet Switching & their comparisons.

Data Link Layer: Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ.

UNIT-III (11 hrs)

Medium Access Sub-Layer: Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE 802.3 frame format, Ethernet cabling.

Network Layer: Design issues, IPv4 classful and classless addressing, subnetting, IPv6, Routing algorithms: distance vector and link state routing, Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms

UNIT-IV (11 hrs)

Transport Layer: Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison, Sockets.

Application Layer: World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), SMTP, POP, HTTP, Introduction to Network security

NOTE: This Subject is common to all branches. Only Introduction of the concepts is given to the students.

RECOMMENDED BOOKS:

1. Andrew S. Tanenbaum, 'Computer Networks', 4th Ed., Pearson Education, **2002**.

2. Behrouz A. Forouzan, 'Data Communication & Networking', 4th Ed., Tata McGraw Hill, **2006**.
3. James F. Kurose and Keith W.Ross, 'Computer Networking', 3rd Ed, Pearson Education, **2012**.
4. W. Stallings, 'Data & computer Communications', 9th Ed., PHI, **2014**.
5. Douglas E. Comer, 'Internetworking with TCP/IP', 2nd Ed., Prentice Hall, India, Volume-I, 1996.
6. Greg Tomsho, 'Guide to Networking Essentials', 6th Ed., Cengage Learning, **2011**.
7. Michael W. Graves, 'Handbook of Networking', Cengage Learning.

MATHEMATICAL METHODS

Subject Code: BMAT0-F92 **L T P C** **Duration: 45 Hrs.**
31 0 4

UNIT–I (8 Hrs.)

Fourier Series: Periodic functions, Euler's formula, Even and odd functions, Half range expansions, Fourier series of different wave forms.

UNIT–II (12Hrs.)

Fourier Transforms: Dirichlet's conditions, Fourier integral formula (without proof), Fourier transform, Inverse Theorem for Fourier transform, Fourier sine and cosine transforms and their inversion formulae, Properties of Fourier transform, Convolution theorem of Fourier transforms, Parseval's identity, Finite Fourier sine and cosine transform, Inversion formula for sine transform.

UNIT-III (13Hrs.)

Laplace Transforms: Laplace transforms of various standard functions, Properties of Laplace transforms, Inverse Laplace transforms, Transform of derivatives and integrals, Laplace transform of unit step function, impulse function, Periodic functions, Applications to solution of ordinary linear differential equations with constant coefficients and simultaneous differential equations.

UNIT-IV (12Hrs.)

Integral Equations: Integral equations of Fredholm and Volterra type, Solution by successive substitution and successive approximation, Integral equations with degenerate kernels, Integral equations of convolution type and their solutions by Laplace transform, Fredholm's theorems, Integral equations with symmetric kernel, Eigen values and Eigen functions of integral equations and their simple properties.

Recommended Books:

1. S L Ross, 'Differential Equations', 3rdEdn., John Wiley & Sons, **2004.**.
2. I.N. Sneddon, 'Special Functions of Mathematical Physics and Chemistry', Edinburg, Oliver & Boyd,**1956.**
3. G. Andrews, R. Askey& R. Roy, 'Special Functions', Cambridge,**1999.**
4. L. Andrews, 'Special Functions for Engineers and Applied Scientists', Mcmillan,**1985**.
5. E.Kreyszing, 'Advanced Engg. Mathematics', 8thEdn., John Wiley, New Delhi.
6. B.S.Grewal, 'Higher Engineering Mathematics', 42ndEdn., Khanna Publishers, **2016**.

OPERATION RESEARCH

Subject Code: BCOM1- 311 **L T P C** **Duration: 45 Hrs.**
4 0 0 4

Course Objectives: The objectives of the Course are to acquaint the students with the applications of the Operations Research to business and industry and help them to grasp the significance of Analytical Approach to Decision Making.

UNIT-I (11 Hrs.)

Operations Research: Nature, Scope, Methodologyof Operations Research and Role in Managerial Decision Making. Linear Programming: Formulation of Problem and its Solution by Graphical and Simplex Methods, Duality.

UNIT-II (11 Hrs.)

Transportation Problems: Formulation, Optimal Solution, Unbalanced Transportation Problem, Degeneracy,Assignment Problems: Formulation, Optimal Solution, Variants of Assignment Problems, Travelling Salesman Problems

UNIT-III (12 Hrs.)

Game Theory: Games with Pure and Mixed Strategies, Saddle Point, Odds Method, Principle of Dominance, Sub Games Method, Equal Gains Method and LPP- Graphic MethodSequencing Problems: Processing N Jobs through two machines, Processingin jobs through three machines.

UNIT–IV (12 Hrs.)

Inventory Models: EOQ Models, Quantity Discount Models, Purchase Inventory Models with one Price Break (Single Discount) and Multiple Discount Breaks. Network Analysis: PERT and CPM Model, Difference between PERT and CPM, Computation of Critical Path, Slack, Floats and Probability of Project Completion by a Target Date.

Course Outcomes: After studying this course, the students learn the role of operations on achieving various competitive capabilities. The students also learn how to help an organization in improving productivity and meeting customer's competitive capabilities.

Recommended Books

1. P.K. Gupta & D.S. Hira, 'Operations Research', S. Chand & Co. Ltd., New Delhi,
2. H.A. Taha, 'Operations Research', Prentice Hall of India, New Delhi,
3. C.K. Mustafi, 'Operations Research', New Age International Pvt. Ltd., New Delhi,
4. M.P. Gupta & J.K. Sharma, 'Operations Research for Management', Mayoor Paperbacks, Delhi.

INDIAN ECONOMIC PROBLEMS

Subject Code: BCOM1-313 **L T P C** **Duration: 45 Hrs.**
4 0 0 4

Course Objectives: The objective of this paper is to acquaint the students with the ability to understand the features and issues of Indian Economy.

UNIT-I (12 Hrs.)

Structure of Indian Economy: Nature of Indian Economy, Occupational Distribution of Labour Force; Poverty and Income Distribution in India, Problems of Unemployment and Rising Prices, Parallel Economy in India.

Demography of India: Demographic Features of Indian Population, Size and Growth of Population in India. Population and Economic Development. Problem of Over Population, Population Policy in India.

UNIT-II (11 Hrs.)

Basic Issues in Indian Agriculture: Role, Nature and Cropping Pattern; Trends in agricultural production and productivity; Factors determining productivity; Agricultural Price Policy, Distress in Indian Agriculture. Rural Indebtedness, Role of NABARD in Rural Development in India.

Issues in Indian Industry: Growth and Problems of Major Industries-Iron and Steel, Cotton Textiles, Cement and Petroleum. Problems and prospects of Cottage and Small Scale Industries in India. Role, problems and scope of Public Sector in India, Industrial Policies in pre and post reforms period.

UNIT-III (11 Hrs.)

Economic Planning: Importance of Planning for Economic Development. Features, objectives, Achievements and Failures of planning in India, Factors affecting successful implementations of plans. Niti Ayog in India: features, structure and it's functioning.

Indian Public Finance: Indian Finance System. Critical evaluation of budgets in India, Taxation Structure, Mobilization of Resources for Development, Fiscal Policy in India

UNIT-IV (11 Hrs.)

External Sector: India's Foreign Trade- Features, Composition and Direction; India's Balance of Payments Problem; Indian Trade Policy; Foreign Capital, Foreign Aid, Multinational Corporations (MNCs); FERA and FEMA.

Forex Market: Methods of Measuring Exchange Rate. Determinants of Exchange Rate, Currency Depreciation and Devaluation, Nature of Indian Forex Market.

Course Outcomes: Students will understand various social, political, legal and economic and other factors that influence business in India so as to enable them appreciate associated opportunities, risks and challenges and their relevance for managerial decisions

Recommended Books

1. S.K. Mishra and Puri, 'Indian Economy', Himalaya Publishers.
2. Arvind Panagariya, 'India: The Emerging Giant', Oxford University Press.
3. Datt, Ruddar and K.P.M. Sundharam, 'Indian Economy', S. Chand & Company Ltd.
4. Uma Kapila, 'Indian Economy: Performance and Policies', Academic Foundation.