BIOLOGY FOR ENGINEERS

II SEMESTER

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

Course Outcomes:

After studying the course, the student will be able to:

CO1: Understand how biological observations lead to major discoveries and the morphological, Biochemical and ecological classification of organisms.

CO2: Understand that all forms of life have the same building blocks and their involvement in the Maintenance and metabolic processes of living organisms.

CO3: Classify enzymes and distinguish between different mechanisms of enzyme action and Study the chemical reactions that are catalyzed by enzymes. Apply thermodynamic Principles to biological systems and able to understand major chemical processes that occur Within a living organism in order to maintain life.

CO4: Identify DNA as a genetic material in the molecular basis of information transfer.

CO5: Identify and classify microorganisms, understand media compositions and growth of Microorganisms

Unit-I*: Introduction

   Part-A: Importance and need of biology- Discoveries of biology in 18th Century: Brownian motion and the origin of thermodynamics- their importance in any scientific inquiry.

   Part-B: Classification of organisms based on (a) Cellularity- Unicellular or Multicellular, (b) Ultra structure- prokaryotes or eucaryotes. (c) Energy and carbon utilization -autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitat-acquatic or terrestrial

(f) Molecular taxonomy- three major kingdoms of life.

Unit-II: Biomolecules

   Part-A: Introduction to molecules of life-monomeric units and polymeric structures of carbohydrates, Sugars, starch and cellulose, amino acids and proteins structure and function.

   Part-B: Nucleotides and DNA/RNA, Hierarchy of DNA Structure- from single stranded to double helix, two carbon units and lipids.

Unit-III: Enzymes & Metabolism

      Part-A: Enzyme classification, mechanism of enzyme action, enzyme kinetics and kinetic parameters.

      Part-B: Thermodynamics as applied to biological systems, endergonic and exergoinc reactions, Concept of kinetic equilibrium and its relation to standard free energy Spontaneity, ATP as an energy currency, Glycolysis, Krebs cycle and Energy yielding and energy consuming reactions.

Unit-IV: Information Transfer

      Part-A: Concept of genetic code.

      Part-B: Molecular basis of information transfer; Transcription and translation.

Unit-V: Microbiology

      Part-A: Concept of species and strains, Identification of Micro organisms.

      Part-B: Sterilization and media compositions, Growth kinetics.

Text/ Reference Books:

1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson EducationLtd

2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons

3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company

4. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBSPublisher

5. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. BrownPublishers

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

II SEMESTER

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

Unit – I: Electric Circuits

Part-A: Basic definitions, Types of network elements & sources, Ohms law, Kirchhoff's laws, Series & parallel circuits.

Part-B: Source transformation, Network reduction reductions, Introduction to AC circuits.

Unit – II: Electrical Machines

Part-A: Basic laws – Faraday's laws of electromagnetic induction, Lenz's law, Right hand thumb rule, Fleming's left hand and right hand rules, Construction, working principle and applications of DCmachines**.**

Part-B: Construction, working principle and applications of transformers, induction motor and synchronous machines.

Unit – III: Electrical Power Generation, Transmission and Distribution

Part-A: Sources of Energy – conventional & non conventional, Introduction and layout of thermal, hydel power plants**.**

Part-B: Introduction and layout of nuclear power plants, solar power plants, Concepts of power transmission and distribution using single line diagram.

Unit – IV: Electrical Installations & Safety

Part-A: Components of Switchgear – fuse, MCBs, types of wires & cables, earthing, different types of batteries, Elementary calculations for energy consumption and types of tariffs.

Part-B: Energy Conservation. Electric shock and first aid, Hazardous areas, General principles of electricsafety.

Unit – V: Basic Electronic Devices and their applications

Part-A: Introduction to semi-conductor physics, PN junction diode, Zener diode, Transistor - operation, characteristics and configurations, Operation of transistor as a switch.

Part-B: Half wave, full wave and bridge rectifier using diodes, types of filters, Zener diode as a voltage regulator, transistor as an amplifier. introduction to feed back amplifiers.

Text/ Reference Books:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.

2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill,2009.

3. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA McGrawHill,

BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

II SEMESTER

Lecture: 0   Practical: 2   Internal Marks:30

Credits: 1   Tutorial: 0   External Marks: 70

Prerequisites: -

Course Outcomes:

- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines and Power Converters.
- To introduce components of Low Voltage Electrical Installations

List of Experiments:

1. Study of different switches, MCBs, measuring instruments, wires and cables.
2. Identification and measurement of resistance, inductance &capacitance.
3. Practice house wiring with MCB, 3 pin sockets, 2-way control of lamp.
4. Load test on DC shunt motor
5. Load test on DC shunt Generator
6. Constructional study of machine and engine parts using their cut sections.
7. Identification and testing of different electronic devices like diode, BJT, FET, SCR, IGBT, MOSFET, UJT etc.,
8. Practice soldering with simple electronic components on PCB.
9. V-I Characteristics of PN junction diode
10. Characteristics of Bipolar Junction Transistor

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III Year - I Semester

L T P C
4 0 0 3

MANAGEMENT SCIENCE

Course Objectives:
*To familiarize with the process of management and to provide basic insight into select contemporary management practices
*To provide conceptual knowledge on functional management and strategic management.

UNIT I
Introduction to Management: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

UNIT II
Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

UNIT III
Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager-Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.

UNIT IV
Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

UNIT V
Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives. Global strategies, theories of Multinational Companies.

UNIT VI
Contemporary Management Practice: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management , Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

Course Outcome:
*After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
*Will familiarize with the concepts of functional management project management and strategic management.

Text Books

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, '*Management Science'* Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, *Management Science'* TMH 2011.

References

1. Koontz & Weihrich: 'Essentials *of management'* TMH 2011
2. Seth & Rastogi: Global Management Systems, Cengage learning , Delhi, 2011
3. Robbins: Organizational Behaviour, Pearson publications, 2011
4. Kanishka Bedi: Production & Operations Management, Oxford   Publications, 2011
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
6. Biswajit Patnaik: Human Resource Management, PHI, 2011
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
8. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.)   Delhi 2015.
9. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.

	L	T	P	C

III Year - I Semester

L	T	P	C
4	0	0	3

TRANSPORTATION ENGINEERING – II

Course Learning Objectives:

The objectives of this course are:

- To know various components and their functions in a railway track
- To acquire design principles of geometrics in a railway track.
- To know various techniques for the effective movement of trains.
- To acquire design principles of airport geometrics and pavements.
- To know the planning, construction and maintenance of Docks and Harbours.

Course Outcomes:

At the end of course, Student will be able to

- Design geometrics in a railway track.
- Design airport geometrics and airfield pavements.
- Plan, construct and maintain Docks and Harbours.

SYLLABUS:

A.RAILWAY ENGINEERING

UNIT – I Components of Railway Engineering: Permanent way components – Railway Track Gauge - Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density – Rail joints.

UNIT – II Geometric Design of Railway Track: Alignment – Engineering Surveys - Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – safe speed on curves – Transition curve – Compound curves – Reverse curves – Extra clearance on curves – widening of gauge on curves – vertical curves – cheek rails on curves.

UNIT – III Turnouts & Controllers: Track layouts – Switches – Design of Tongue Rails – Crossings – Turnouts – Layout of Turnout – Double Turnout – Diamond crossing – Scissors crossing. Signal Objectives – Classification – Fixed signals – Stop signals – Signalling systems – Mechanical signalling system – Electrical signalling system – System for Controlling Train Movement – Interlocking – Modern signalling Installations.

B.AIRPORT ENGINEERING

UNIT – IV Airport Planning & Design: Airport Master plan – Airport site selection – Air craft characteristics – Zoning laws – Airport classification – Runway orientation – Wind rose diagram – Runway length – Taxiway design – Terminal area and Airport layout – Visual aids and Air traffic control.

UNIT – V Runway Design: Various Design factors – Design methods for Flexible pavements – Design methods for Rigid pavements – LCN system of Pavement Design – Airfield Pavement Failures – Maintenance and Rehabilitation of Airfield pavements – Evaluation & Strengthening of Airfield pavements – Airport Drainage – Design of surface and subsurface drainage.

C.DOCKS & HARBOURS

UNIT – VI Planning, Layout, Construction & Maintenance Of Docks & Harbors: Classification of ports – Requirement of a good port – classification of Harbors – Docks - Dry & wet docks – Transition sheds and workhouses – Layouts; Quays – construction of Quay walls – Wharves – Jetties – Tides - Tidal data and Analysis – Break waters – Dredging – Maintenance of Ports and Harbors – Navigational aids.

TEXT BOOKS:
1. Railway Engineering, Satish Chandra and Agarwal M. M., Oxford University Press, New Delhi
2. Airport Engineering, Khanna & Arora - Nemchand Bros, New Delhi.
3. Docks and Harbor Engineering, Bindra S.P. – Dhanpathi Rai & Sons, New Delhi.

REFERENCES:
1. Railway Engineering, Saxena & Arora – Dhanpat Rai, New Delhi.
2. Transportation Engineering Planning Design, Wright P. H. & Ashfort N. J., John Wiley & Sons.
3. Transportation Engineering Volume II, C Venkatramaiah, 2016, Universities Press, Hyderabad.
4. Transportation Engineering, Railways, Airports, Docks & Harbours, Srinivasa Kumar R, University Press, Hyderabad
5. Airport Engineering Planning & Design, Subhash C. Saxena, 2016, CBS Publishers, New Delhi.
6. Highway, Railway, Airport and Harbor Engineering, Subramanian K. P, Scitech Publications (India) Pvt Limited, Chennai
7. Airport Engineering, Virendra Kumar, Dhanpat Rai Publishers, New Delhi.

	L	T	P	C
III Year - I Semester

$$\begin{array}{cccc} L & T & P & C \\ 0 & 0 & 3 & 2 \end{array}$$

CONCRETE TECHNOLOGY LAB

Course Learning Objectives:

- To test the basic properties ingredients of concrete, fresh and hardened concrete properties

Course Outcomes:

Upon successful completion of this course, student will be able to

- Determine the consistency and fineness of cement.
- Determine the setting times of cement.
- Determine the specific gravity and soundness of cement.
- Determine the compressive strength of cement.
- Determine the workability of cement concrete by compaction factor, slump and Vee – Bee tests
- Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
- Determine the flakiness and elongation index of aggregates.
- Determine the bulking of sand.
- Understand the non-destructive testing procedures on concrete.

List of Experiments: At least 10 experiments must be conducted (at least one for each property)

1. Determination of normal Consistency and fineness of cement.

2. Determination of initial setting time and final setting time of cement.

3. Determination of specific gravity and soundness of cement.

4. Determination of compressive strength of cement.

5. Determination of grading and fineness modulus of Coarse aggregate by sieve analysis.

6. Determination of specific gravity of coarse aggregate

7. Determination of grading and fineness modulus of fine aggregate (sand) by sieve analysis.

8. Determination of bulking of sand.

9. Determination of workability of concrete by compaction factor method.

10. Determination of workability of concrete by slump test

11. Determination of workability of concrete by Vee-bee test.

12. Determination of compressive strength of cement concrete and its young's modulus.

13. Determination of split tensile strength of concrete.

14. Non-Destructive testing on concrete (for demonstration)

List of Equipment:

1. Standard set of sieves for coarse aggregate and fine aggregate

2. Vicat's apparatus

3. Specific gravity bottle.

4. Lechatlier's apparatus.

5. Slump Test Apparatus.

6. Compaction Factor Test Apparatus.

7. Vee- Bee test apparatus

8. Longitudinal compresso meter

9. Universal testing Machine (UTM)/Compression Testing Machine (CTM).

10. Rebound hammer, Ultrasonic pulse velocity machine, micro cover meter etc.

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III Year - I Semester

L	T	P	C
0	0	3	2

TRANSPORTATION ENGINEERING LAB

Course Learning Objectives:

The objective of this course is:

- To test crushing value, impact resistance, specific gravity and water absorption, percentage attrition, percentage abrasion, flakiness index and elongation index for the given road aggregates.
- To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
- To test the stability for the given bitumen mix
- To carry out surveys for traffic volume, speed and parking.

Course outcomes:

- Ability to test aggregates and judge the suitability of materials for the road construction
- Ability to test the given bitumen samples and judge their suitability for the road construction
- Ability to obtain the optimum bitumen content for the mix design
- Ability to determine the traffic volume, speed and parking characteristics.

SYLLABUS:

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

1. Marshall Stability test.

IV. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.

2. Traffic Volume Studies (Turning Movements) at intersection.

3. Spot speed studies.

4. Parking study.

V. DESIGN & DRAWING:

1. Earthwork calculations for road works.

2. Drawing of road cross sections.

3. Rotors intersection design.

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.

2. Aggregate Impact testing machine

3. Pycnometers.

4. Los angles Abrasion test machine

5. Deval's Attrition test machine

6. Length and elongation gauges

7. Bitumen penetration test setup.

8. Bitumen Ductility test setup.

9. Ring and ball apparatus

10. Viscometer.

11. Marshal Mix design apparatus.

12. Enoscope for spot speed measurement.

13. Stop Watches

Text Books:

1. Highway Material Testing Manual, S. K. Khanna, C. E. G Justo and A. Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.

Reference Books:

1. I R C Codes of Practice

2. Asphalt Institute of America Manuals

3. Code of Practice of B.I.S.

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III Year - II Semester	**4**	**0**	**0**	**3**

GEOTECHNICAL ENGINEERING – I

Course Learning Objectives:

The objective of this course is:

- To enable the student to find out the index properties of the soil and classify it.
- To impart the concept of seepage of water through soils and determine the seepage discharge.
- To enable the students to differentiate between compaction and consolidation of soils and to determine the magnitude and the rate of consolidation settlement.
- To enable the student to understand the concept of shear strength of soils, assessment of the shear parameters of sands and clays and the areas of their application.

Course Outcomes:

Upon the successful completion of this course

- The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.
- The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
- The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
- The student should be able to apply the above concepts in day-to-day civil engineering practice.

SYLLABUS:

UNIT – I Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density , Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

UNIT – II Index Properties Of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNIT –III Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. Total, neutral and effective stresses –quick sand condition – 2-D flow and Laplace's equation - Seepage through soils – Flow nets: Characteristics and Uses.

UNIT – IV Stress Distribution In Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method.

UNIT – V Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) - Over consolidated and normally consolidated clays.

UNIT – VI Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions.

Text Books:

1. Basic and Applied Soil Mechanics, Gopal Ranjan and A. S. R. Rao, New Age International Publishers.
2. Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS publishers

References:

1. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.

2. An introduction to Geotechnical Engineering, Holtz and Kovacs; Prentice Hall.

3. Fundamentals of Geotechnical Engineering, B M Das, Cengage Learning, New Delhi.

WASTE WATER MANAGEMENT
OPEN ELECTIVE

Learning Objectives:
- Outline planning and the design of waste water collection ,conveyance and treatment systems for a community/town/city
- Provide knowledge of characterization of waste water generated in a community
- Impart understanding of treatment of sewage and the need for its treatment
- Summarize the appurtenance in sewage systems and their necessity
- Teach planning and design of septic tank and imhoff tank and the disposal of the effluent from these low cost treatment systems
- Effluent disposal method and realize the importance of regulations in the disposal of effluents in rivers

UNIT-I:
Introduction to Sanitation-Systems of sanitation- relative merits and demerits - collection and conveyance of waste water - classification of sewerage systems-Estimation of sewage flow and storm water drainage- fluctuations-types of sewers- Hydraulics of sewers and storm drains-design of sewers- appurtenances in sewerage- cleaning and ventilation of sewers

UNIT-II:
Pumping of wastewater: Pumping stations-location- components- types of pumps and their suitability with regard to wastewaters.
House Plumbing: Systems of plumbing-sanitary fittings and other accessories-one pipe and two pipe systems-Design of building drainage

UNIT-III:
Sewage characteristics-Sampling and analysis of waste water-Physical, chemical and Biological examination-measurement of BOD & COD- BOD equations
Treatment of sewage: Primary treatment- Screens-grit chambers- grease traps- floatation-sedimentation-design of preliminary and primary treatment units.

UNIT-IV:
Secondary treatment: Aerobic and anaerobic treatment process -comparison.
Suspended growth process: Activated sludge process, principles, design and operational problems, modifications of Activated sludge processes, Oxidation ponds, Aerated Lagoons.
Attached Growth process: Trickling Filters-mechanism of impurities removal-classification-design -operation and maintenance problems. RBCs. Fluidized bed reactors

UNIT-V:
Miscellaneous Treatment Methods: Nitrification and Denitrification- Removal of phosphates-UASB- Membrane reactors- Integrated fixed film reactors. Anaerobic Processes: Septic Tanks, Imhoff tanks- working principles and Design-disposal of septic tank effluent-FAB Reactors

UNIT-VI:
Bio-solids (sludge) management: Characteristics- handling and treatment of sludge-thickening-anaerobic digestion of sludge
Disposal of sewage: Methods of disposal- disposal into water bodies- Oxygen sag Curve-Disposal into sea-disposal on land- sewage sickness

Outcomes:
By the end of successful completion of this course, the students will be able to:
- Plan and design the sewerage systems
- Characterization of sewage
- Select the appropriate appurtenances in the sewerage systems
- Select the suitable treatment flow for sewage treatment
- Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river

Text Book:
1. Waste water Engineering Treatment and Reuse by Metcalf & Eddy, Tata McGraw- Hill edition.
2. Elements of Environmental Engineering by K.N. Duggal, S.Chand & Company Ltd. New Delhi, 2012.
3. Environmental Engineering by Howard S.Peavy , Donald R. Rowe, Teorge George Tchobanoglus- Mc-Graw-Hill Book Company, New Delhi, 1985
4. Wastewater Treatment for pollution control and Reuuse, by soli.J Areivala, sham R Asolekar, Mc-GrawHill, New Delhi; 3rd Edition
5. Industrial water & wastewater management by KVSG MuraliKrishna

Reference Book:
1. Environmental Engineering-II: Sewage disposal and Air pollution Engineering , by Garg, S.K.,: Khanna publishers
2. Sewage treatment and disposal by Dr.P.N.Modi & Sethi.
3. Environmental Engineering, by Ruth F. Weiner and Robin Matthews- 4th Edition Elsevier, 2003
4. Environmental Engineering by D. Srinivasan, PHI Learning private Limited , New Delhi,2011.

	L	T	P	C
III Year - II Semester	0	0	3	2

GEOTECHNICAL ENGINEERING LAB

Course Learning Objectives:

The objective of this course is:

- To impart knowledge of determination of index properties required for classification of soils.
- To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
- To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes:

Upon successful completion of this course, student will be able to

- Determine index properties of soil and classify them.
- Determine permeability of soils.
- Determine Compaction, Consolidation and shear strength characteristics.

SYLLABUS:

LIST OF EXPERIMENTS

1. Specific gravity, G
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests
7. Compaction test
8. Consolidation test (to be demonstrated)
9. Direct Shear test
10. Triaxial Compression test (UU Test)
11. Unconfined Compression test
12. Vane Shear test
13. Differential free swell (DFS)
14. CBR Test

At least **Ten** experiments shall be conducted.

LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrinkage limits
3. Field density apparatus for
   a) Core cutter method
   b) Sand replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
5. Hydrometer
6. Permeability apparatus for
   a) Constant head test
   b) Variable head test
7. Universal auto compactor for I.S light and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolation test apparatus with all accessories.
12. Triaxial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot air ovens (range of temperature 50^0 - 150^0C

Reference:

1. Determination of Soil Properties, J. E. Bowles.
2. IS Code 2720 – relevant parts.

ENVIRONMENTAL ENGINEERING LAB

Course Learning Objectives:

The course will address the following:

- Estimation some important characteristics of water and wastewater in the laboratory
- It also gives the significance of the characteristics of the water and wastewater

Course Outcomes:

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

- Estimation some important characteristics of water and wastewater in the laboratory
- Draw some conclusion and decide whether the water is potable or not.
- Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments
- Estimation of the strength of the sewage in terms of BOD and COD

SYLLABUS:

List of Experiments

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.

2. Determination and estimation of Total Hardness–Calcium & Magnesium.

3. Determination of Alkalinity/Acidity

4. Determination of Chlorides in water and soil

5. Determination and Estimation of total solids, organic solids and inorganic solids and settleable solids by Imhoff Cone.

6. Determination of Iron.

7. Determination of Dissolved Oxygen with D.O. Meter & Wrinklers Method and B.O.D.

8. Determination of N, P, K values in solid waste

9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.

10. Determination of C.O.D.

11. Determination of Optimum coagulant dose.

12. Determination of Chlorine demand.

13. Presumptive Coliform test.

NOTE: At least 10 of the above experiments are to be conducted.

List of Equipments

1) pH meter

2) Turbidity meter

3) Conductivity meter

4) Hot air oven

5) Muffle furnace

6) Dissolved Oxygen meter

7) U–V visible spectrophotometer

8) COD Reflux Apparatus

9) Jar Test Apparatus

10) BOD incubator

11) Autoclave

12) Laminar flow chamber

13) Hazen's Apparatus

Text Books

1. Standard Methods for Analysis of Water and Waste Water – APHA

2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi

Reference

1. Relevant IS Codes.

2. Chemistry for Environmental Engineering by Sawyer and Mc. Carty.

LINEAR ALGEBRA & DIFFERENTIAL CALCULUS

B.Tech I SEMESTER

Prerequisites: -

L T P C
3 1 0 4

Course Outcomes:

- Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations

- Illustrate the methods of computing eigen values and eigen vectors

- Able to analyze the real life situations, formulate the differential equations then apply the solving methods

- Explain the techniques of solving the linear differential equations

- Optimize functions of several variables and able to find extreme values of constrained functions

Syllabus:

UNIT I: Linear systems of equations, Eigen values & Eigen vectors

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence, Consistency of linear system of equations, System of linear homogeneous equations.

Gauss -Jordan method, LU decomposition method, **Application:** Finding the current in electrical circuits, Eigen values, Eigen vectors, Properties of Eigen values(without proofs).

UNIT II: Quadratic forms & Differential calculus:

Cayley-Hamilton theorem(without proof), Reduction to diagonal form, Reduction of quadratic form to canonical form, Nature of quadratic form. Limits and continuity and differentiability, Mean value theorems, Taylor's and Maclaurin's series.

Functions of two variables, Partial derivatives, Homogeneous functions, Total derivative, Jacobian, Taylor's theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT III: Differential equations of first order:

Formation of a differential equation, Solution of a differential equation, Variables separable method, 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.

UNIT IV: Differential equations higher order:

Part –A: Definitions, Complete solution, Operator D, Rules to find Complementary function, Inverse operator, Rules to find the particular integral(RHS term of the type e^{ax} , Sin(ax+b), cos(ax+b), polynomials in x).

Rules to find the particular integral(RHS term of the type e^{ax} V(x), any other function), Method of variation of parameters. **Application:** L-C-R circuits.

UNIT V: 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.

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

Text Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43ʳᵈEdition, 2014.

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

Reference Books:

1. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi

     Publications, 9ᵗʰ Edition, 2014.

2. **ERWIN KREYSZIG,** Advanced Engineering Mathematics, John Wiley & Sons, 10ᵗʰ

     Edition, 2015.

PROBLEM SOLVING APPROACHES THROUGH C

B.Tech I SEMESTER

L T P   C
3 0 0   3

Prerequisites: -

Course Outcomes

The student will learn
- To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To use structures and files

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.

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. Muti way decision making statements: else if, Switch statement

Looping 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. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Krnighan. B.W and Ritche, D.M, "The C Programming Language", Second Edition, Pearson Education, 2006
3. Pradep dey, Manas Ghosh, "Fundamentals of Computing and programming in C", First Edition, Oxford University Press, 2009.

References:

1. Paul Deitel and Harvey Deitel, "C How to Program", Seventh Edition, Pearson Publication.
2. E Balagursamy, "Programming in C, Sixth Edition, Tata McGraw Hill.
3. Ajay Mittal, "Programming in C A practical Approach", Pearson education

ENGINEERING GRAPHICS

B.Tech I SEMESTER

                                                                      L T P C
                                                                      3 0 0 3

Prerequisites: -

Course Outcomes:

CO1: Draw the polygons, ellipse, parabola, hyperbola, cycloids and involutes for various types of profiles.

CO2: Construction of various scales like plain, diagonal and venier scales .Draw the orthographic projections of the points, lines.

CO3: Draw the projections of planes.

CO4: Draw the projections of solids

CO5: Convert Orthographic projections to isometric projection and vice versa.

Syllabus:

UNIT I:

 Lettering, Dimensioning, Geometrical Constructions. Polygons: General construction method, Inscribing and describing methods.

  Cycloids: Cycloid, Epicycloid, Hypocycloid and Involutes- Tangent and Normals to the above curves.

UNIT II :

 Orthographic projections: Introduction, Projections of points.

Projections of straight lines- parallel to both the planes, parallel to one plane and inclined to the other plane.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT III

 Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane;

 Projections of planes inclined to both the reference planes.

UNIT IV:

 Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the reference planes.

 Sections of solids: Prisms, Pyramids, Cones and Cylinders in simple positions.

UNIT V:

 Isometric Projections: Isometric views/projections of planes and simple solids, Conversion of orthographic views to isometric views.

Conversion of isometric views to orthographic views. Introduction to AutoCAD

Text Books:

1. Engineering Drawing, N. D. Butt, Chariot Publications

2. Engineering Drawing +Auto CAD, K Venugopal &V Prabhuraja, Newage Publishers.

Reference Books:

1. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.

2. Engineering Graphics for Degree, K. C. John, PHI Publishers

3. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers

4. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

PROBLEM SOLVING APPROACHES THROUGH 'C' LAB

B.Tech I SEMESTER

L T P   C
0 0 3   1.5

Prerequisites: -

Syllabus:

1. Write a C program to convert temperature from Fahrenheit to Celsius.

   Write a C program to find the roots of a quadratic equation.

   Write a program to implement simple calculator using switch case

2. Write a C program to determine if the given number is a prime number or not.

   Write a program to display the factorial of a given number

3. Write a program to display whether a given is Armstrong or not

   Write a C program to generate the first n terms of the Fibonacci sequence.

4. Write a C program to display the reverse of a given number.

   Write a C program to calculate the following sin and cos value

5. Write a program for sorting numbers in a list.

6. Write programs for searching a number in the list using

   a. Linear search

   b. Binary search

7. Write programs that reads two matrices to perform the following:

   a. Addition of two matrices

   b. Multiplication of two matrices

8. Write a program to perform the following operations without using build in string operations:

   a. To display the length of the string.

   b. To check whether the string is palindrome or not

   c. To delete n characters from a given position in a given string.

9. Write a program to generate GCD of two numbers using functions

10. Write a C program that reads two integers n and r to compute the ncr value using the following relation: ncr(n, r) = n! / r! (n,r)! . Use a function for computing the factorial value of an integer.

11. Write programs for the following using recursive functions

    a. Factorial of a given number

    b. GCD of two numbers

    c. Fibonacci series

_____

12. Write a program to demonstrate call by value and call by reference.

13. Write a program to perform following operating using pointers

    a. Reverse of a string

    b. Comparison of two strings

14. Write a program for displaying the details of the student by sorting them according to the marks using structure containing roll no, name and marks.

15. Write a program for merging two files

16. Write a program to count no of lines, words, characters in a file

17. C Program to Create Employee File Name Record that is taken from the Command Line Argument

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FIELD PRACTICE LAB

B.Tech I SEMESTER

Prerequisites: -

L T P C
0 0 2 1

1. Study of various supply systems

2. Study of different switches, MCBs, measuring instruments, wires and cables.

3. Identification and measurement of resistance, inductance & capacitance.

4. Practice house wiring with MCB, 3 pin socket, 2 way control of lamp.

5. Practice soldering with simple electronic components on PCB.

6. Estimation of Power loads

7. Maintenance /Charging of the Batteries.

8. Testing and repair of Iron box, kettle

9. Testing of Refrigerator

10. Testing of Geyser

VECTOR CALCULUS AND FOURIER TRANSFORMS

B.Tech II SEMESTER

Syllabus:

L T P C
3 0 0 3

UNIT I: Special functions & Multiple integrals:

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

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

UNIT II: Vector Calculus:

Vector Differentiation: Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, Del applied to vector point functions-Div& Curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

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

UNIT III: Fourier Series:

Euler's formulae(without proof), Conditions of a Fourier expansion, Functions having points of discontinuity.

Change of interval, Even and odd functions, Half-range series.

UNIT IV: Fourier Transforms:

Fourier Integral, Fourier cosine & sine integral, complex forms of Fourier integral.

Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms(without proof), Convolution theorem(without proof), finite Fourier sine & cosine transforms.

UNIT V: Applications of Partial Differential Equations:

Definition of PDE, Classification of 2nd order PDE, Variable separable method, Vibrations of a stretched string – Wave equation.

One-dimensional heat flow, Two-dimensional heat flow, Solution of Laplace's equation.

Text Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rdEdition, 2014.

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

Reference Books:

1. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi

   Publications, 9th Edition, 2014.

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

BIOLOGY FOR ENGINEERS

B.Tech II SEMESTER

L T P C
2 0 0 2

Course Outcomes

After studying the course, the student will be able to:

CO1: Understand how biological observations lead to major discoveries and the morphological,
 Biochemical and ecological classification of organisms.

CO2: Understand that all forms of life have the same building blocks and their involvement in
 the Maintenance and metabolic processes of living organisms.

CO3: Classify enzymes and distinguish between different mechanisms of enzyme action and
 Study the chemical reactions that are catalyzed by enzymes. Apply thermodynamic
 Principles to biological systems and able to understand major chemical processes that occur
 Within a living organism in order to maintain life.

CO4: Identify DNA as a genetic material in the molecular basis of information transfer.

CO5: Identify and classify microorganisms, understand media compositions and growth of
 Microorganisms

Unit-1: Introduction
 Importance and need of biology- Discoveries of biology in 18th Century: Brownian motion and the origin of thermodynamics- their importance in any scientific inquiry.

 Classification of organisms based on (a) Cellularity- Unicellular or Multicellular , (b) Ultra structure- prokaryotes or eucaryotes. (c) Energy and carbon utilization -autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitat- acquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life.

Unit-2: Biomolecules
 Introduction to molecules of life-monomeric units and polymeric structures of carbohydrates, Sugars, starch and cellulose, amino acids and proteins structure and function.

 Nucleotides and DNA/RNA, Hierarchy of DNA Structure- from single stranded to double helix, two carbon units and lipids.

Unit-3: Enzymes & Metabolism
 Enzyme classification, mechanism of enzyme action, enzyme kinetics and kinetic parameters.

 Thermodynamics as applied to biological systems, endergonic and exergoinc reactions, Concept of kinetic equilibrium and its relation to standard free energy Spontaneity, ATP as an

energy currency, Glycolysis,   Krebs cycle and Energy yielding and energy consuming reactions.

Unit-4: Information Transfer
Concept of genetic code.

Molecular basis of information transfer; Transcription and translation.

Unit-5: Microbiology
Concept of species and strains, Identification of Micro organisms.

Sterilization and media compositions, Growth kinetics.

Text/Reference Books:
1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons
3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

POWER SYSTEMS-I

B.Tech II SEMESTER   **L T P C**
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Prerequisites: -

UNIT-I Thermal Power Stations
 Selection of site, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super, heaters, Economizers, electrostatic precipitators
 Steam Turbines: Impulse and reaction turbines, Condensers, feed water circuit, Cooling towers and Chimney.

UNIT-II Hydel & Nuclear Power Stations
 Hydro Power Stations: Choice of site, arrangement of hydroelectric installations, Hydrology. Mass curve, flow duration curve, classification of Hydro Power Plants, pumped storage plants.
 Nuclear Power Stations: Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors and brief description of PWR, BWR and FBR.Radiation: Radiation hazards and Shielding, nuclear waste disposal.

UNIT-III Solar power generation
 Solar radiation spectrum. Radiation measurement. Applications of solar thermal systems Solar Photovoltaic(SPV) systems,
 Applications of Solar Photovoltaic systems, Green Building, Solar – thermal, Solar – PV), Present Status of PV in India, Numerical problems

UNIT- IV Wind Power Generation
 Introduction to wind energy, basic principles of wind energy conversion, forces on the blade power in the wind – maximum power, wind energy conversion – wind data and (qualitative treatment only) energy estimation, Basic components of wind energy conversion systems.
 Classification of WECS-HAWT, VAWT, Geared wind power plants (WPPs), direct-drive WPPs and Hybrid (semi-geared) WPPs, Schemes of electric generation, Site selection considerations. Numerical problems

UNIT-V Economic Aspects of Power Generation & Tariff
 Economic Aspects - Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants.
 Tariff Methods- Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three–part, and power factor tariff methods.

Text Books:
   1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, S.Bhatnagarand, A Chakrabarti, DhanpatRai& Co. Pvt. Ltd.
   2. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers
   3. Non-Conventional Energy Resources/ Khan B.H/ Tata McGraw Hill, New Delhi, 2006

ENVIRONMENTAL SCIENCE

B.Tech II SEMESTER

Prerequisites: -

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Course Outcomes

CO1	The importance of environment, Natural resources and current global environmental Challenges for the sustenance of the life on planet earth.
CO2	The concepts of the ecosystem and its function in the environment
CO3	The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
CO4	The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
CO5	The environmental legislations of India and Social issues and the possible means to
CO6	Environmental assessment and the stages involved in EIA.

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

UNIT-II: ECOSYSTEM

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-III : 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-IV: **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-V: 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-VI: ENVIRONMENTAL LEGISLATION &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 Envirronmental 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

REFERENCE:

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

RENEWABLE ENERGY SOURCES

Preamble:

This course gives a flavor of renewable sources and systems to the students. It introduces solar energy its radiation, collection, storage and its applications. This covers generation, design, efficiency and characteristics of various renewable energy sources including solar, wind, hydro, biomass, fuel cells and geothermal systems.

Learning Objectives:
- To study the solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- To study solar thermal collections.
- To study solar photo voltaic systems.
- To study maximum power point techniques in solar pv and wind energy.
- To study wind energy conversion systems, Betz coefficient, tip speed ratio.
- To study basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

UNIT–I:
Fundamentals of Energy Systems and Solar energy
Energy conservation principle – Energy scenario (world and India) – various forms of renewable energy - Solar radiation**:** Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT–II:
Solar Thermal Systems
Liquid flat plate collectors**:** Performance analysis –Transmissivity– Absorptivity product collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT–III:
Solar Photovoltaic Systems
Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems – Balance of system components - System design**:** storage sizing – PV system sizing – Maximum power point techniques**:** Perturb and observe (P&O) technique – Hill climbing technique.

UNIT–IV:
Wind Energy
Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking – wind farms – Power generation for utility grids.

UNIT–V:
Hydro and Tidal power systems
Basic working principle – Classification of hydro systems**:** Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices – Linear generators.

UNIT–VI:
Biomass, fuel cells and geothermal systems
Biomass Energy**:** Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.
Fuel cell**:** Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics.
Geothermal**:** Classification – Dry rock and hot acquifer – Energy analysis – Geothermal based electric power generation

Learning Outcomes:
Student should be able to
- Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.
- Design solar thermal collectors, solar thermal plants.
- Design solar photo voltaic systems.
- Develop maximum power point techniques in solar PV and wind energy systems.
- Explain wind energy conversion systems, wind generators, power generation.
- Explain basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

Text Books:
1. Solar Energy**:** Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis - second edition,2013.

Reference Books:
1. Energy Science**:** Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press.
2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rd edition,2013.
3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.
6. Non conventional energy source –B.H.khan- TMH-2nd edition.

SIGNALS & SYSTEMS

OBJECTIVES:

The main objectives of this course are given below:
- To introduce the terminology of signals and systems.
- To introduce Fourier tools through the analogy between vectors and signals.
- To introduce the concept of sampling and reconstruction of signals.
- To analyze the linear systems in time and frequency domains.
- To study z-transform as mathematical tool to analyze discrete-time signals and systems.

UNIT- I: INTRODUCTION: Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT –II: FOURIER SERIES AND FOURIER TRANSFORM:
Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

UNIT –III: SAMPLING THEOREM – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT-IV: ANALYSIS OF LINEAR SYSTEMS: Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Cross-correlation and auto-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT –V: LAPLACE TRANSFORMS : Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Relation

between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT –VI: Z–TRANSFORMS : Fundamental difference between continuous-time and discrete-time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in
Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
3. Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Pub.

REFERENCE BOOKS:

1. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2nd Edition.
2. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press, 2015
3. Signals and Systems – K Raja Rajeswari, B VisweswaraRao, PHI, 2009
4. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
5. Signals and Systems – T K Rawat , Oxford University press, 2011

OUTCOMES:

At the end of this course the student will able to:

- Characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
- Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
- Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
- Understand the relationships among the various representations of LTI systems
- Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.
- Apply z-transform to analyze discrete-time signals and systems.

ELECTRICAL MEASUREMENTS
LABORATORY

Learning 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.

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. Calibration of PMMC ammeter and voltmeter using Crompton D.C. Potentiometer
4. Measurement of resistance and Determination of Tolerance using Kelvin's double Bridge.
5. Capacitance Measurement using Schering bridge.
6. Inductance Measurement using Anderson bridge.
7. Measurement of 3 phase reactive power with single phase wattmeter for balanced loading.
8. Calibration of LPF wattmeter by direct loading.
9. Measurement of 3 phase power with single watt meter and using two C.Ts.
10. Testing of C.T. using mutual inductance method.
11. Testing of P.T. using absolute null method.
12. Dielectric oil testing using H.T test Kit.
13. Calibration of AC voltmeter and measurement of choke parameters using AC Potentiometer in polarform.
14. Measurement of Power by 3 Voltmeter and 3 Ammeter method.

Learning Outcomes:

- To be able to measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance.
- To be able to test transformer oil for its effectiveness.
- To be able to measure the parameters of inductive coil.

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DATA STRUCTURES THROUGH C++

OBJECTIVES:
- To be familiar with basic techniques of object oriented principles and exception handling using C++
- To be familiar with the concepts like Inheritance, Polymorphism
- Solve problems using data structures such as linear lists, stacks, queues, hash tables
- Be familiar with advanced data structures such as balanced search trees, AVLTrees, and B Trees.

UNIT-I: ARRAYS
Abstract Data Types and the C++ Class, An Introduction to C++ Class- Data Abstraction and Encapsulation in C++- Declaring Class Objects and Invoking Member Functions- Special Class Operations- Miscellaneous Topics- ADTs and C++Classes, The Array as an Abstract Data Type, The Polynomial Abstract Data type-   Polynomial Representation- Polynomial Addition.   Spares Matrices,Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

UNIT-II: STACKS AND QUEUES
Templates in C++, Template Functions- Using Templates to Represent Container Classes, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

UNIT-III: LINKED LISTS
Single Linked List and Chains, Representing Chains in C++, Defining a Node in C++- Designing a Chain Class in C++- Pointer manipulation in C++- Chain Manipulation Operations, The Template Class Chain, Implementing Chains with Templates- Chain Iterators- Chain Operations- Reusing a Class, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Equivalence Classes, Sparse Matrices, Sparse Matrix Representation- Sparse Matrix Input- Deleting a Sparse Matrix, Doubly Linked Lists, Generalized Lists, Representation of Generalized Lists- Recursive Algorithms for Lists- Reference Counts, Shared and Recursive Lists

UNIT-IV: TREES
Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.

UNIT-V: GRAPHS

The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal S Algorithm, Prim s Algorithm Sollin' s Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.

UNIT-VI: SORTING

Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort.

OUTCOMES:

- Distinguish between procedures and object oriented programming.
- Apply advanced data structure strategies for exploring complex data structures.
- Compare and contrast various data structures and design techniques in the area of Performance.
- Implement data structure algorithms through C++. • Incorporate data structures into the applications such as binary search trees, AVL and B Trees
- Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs

TEXT BOOKS:

1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press, Pvt. Ltd.
2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd.Second, Edition.
3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

REFERENCE BOOKS:

1.Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
2.Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

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UNIX AND SHELL PROGRAMMIN
OPEN ELECTIVE

OBJECTIVES:

- Written technical communication and effective use of concepts and terminology.

- Facility with UNIX command syntax and semantics.

- Ability to read and understand specifications, scripts and programs.

- Individual capability in problem solving using the tools presented within the class. Students will demonstrate a mastery of the course materials and concepts within in class
  discussions.

UNIT-I
Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II
The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

UNIT-III
Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

UNIT-IV
Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V
Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.

UNIT-VI

The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

OUTCOMES:

- Documentation will demonstrate good organization and readability.
- File processing projects will require data organization, problem solving and research.
- Scripts and programs will demonstrate simple effective user interfaces.
- Scripts and programs will demonstrate effective use of structured programming.
- Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.
- Testing will demonstrate both black and glass box testing strategies.
- Project work will involve group participation.

TEXT BOOKS:

1. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Parson.
2. Unix programming environment by Brain W. Kernighan & Rob Pike, Pearson.

REFERENCE BOOKS:

1. Unix and shell programmingby B.M. Harwani, OXFORD university press.

OOPs through Java

OBJECTIVE:
- To strengthen their problem solving ability by applying the characteristics of an object- oriented approach.
- To introduce object oriented concepts in C++ and Java.

Programming:

1. Write a Programme that computes the simple interest and compound interest payable on principal amount (in Rs.) of loan borrowed by the customer from a bank for a giver period of time (in years) at specific rate of interest. Further determine whether the b bank will benefit by charging simple interest or compound interest

2. Write a Programme to calculate the fare for the passengers traveling in a bus. When a Passenger enters the bus, the conductor asks "What distance will you travel?" On knowing distance from passenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

3. Write a C++ Program to illustrate Enumeration and Function Overloading

4. Write a C++ Program to illustrate Scope and Storage class

5. Implementation of ADT such as Stack and Queues

6. Write a C++ Program to illustrate the use of Constructors and Destructors and Constructor Overloading

7. Write a Program to illustrate Static member and methods

8. Write a Program to illustrate Bit fields

9. Write a Program to overload as binary operator, friend and member function

10. Write a Program to overload unary operator in Postfix and Prefix form as member and friend function

11. Write a C++ Program to illustrate Iterators and Containers

12. Write a C++ Program to illustrate function templates

13. Write a C++ Program to illustrate template class

14. Write C++ Programs and incorporating various forms of Inheritance

15. Write a C++ Program to illustrate Virtual functions

16. To write a C++ program to find the sum for the given variables using function with default arguments.

17. To write a C++ program to find the value of a number raised to its power that demonstrates a function using call by value.

18. To write a C++ program and to implement the concept of Call by Address

19. To write a program in C++ to prepare a student Record using class and object

20. To implement the concept of unary operator overloading by creating a C++ program.

21. Write a C++ program for swapping two values using function templates

22. Write a C++ program to implement a file handling concept using sequential access.

OUTCOMES:
- Explain what constitutes an object-oriented approach to programming and identify potentialbenefits of object-oriented programming over other approaches.
- Apply an object-oriented approach to developing applications of varying complexities

VLSI DESIGN

Objectives:

The main objectives of this course are:

- Basic characteristics of MOS transistor and examines various possibilities for configuring inverter circuits and aspects of latch-up are considered.
- Design processes are aided by simple concepts such as stick and symbolic diagrams but the key element is a set of design rules, which are explained clearly.
- Basic circuit concepts are introduced for MOS processes we can set out approximate circuit parameters which greatly ease the design process.

Outcomes:

At the end of this course the student can able to:

- Understand the properties of MOS active devices and simple circuits configured when using them and the reason for such encumbrances as ratio rules by which circuits can be interconnected in silicon.
- Know three sets of design rules with which nMOS and CMOS designs may be fabricated.
- Understand the scaling factors determining the characteristics and performance of MOS circuits in silicon.

Syllabus:

Unit-I:

Introduction and Basic Electrical Properties of MOS Circuits: Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS. I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. nMOS Inverter, Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms of pull-up, The CMOS Inverter, Latch-up in CMOS circuits, Bi-CMOS Inverter, Comparison between CMOS and BiCMOS technology.   **(Text Book-1)**

Unit-II:

MOS and Bi-CMOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µm Double Metal, Double Poly, CMOS/BiCMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.
        (Text Book-1)

Unit-III:

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers.

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise and current density. Switch logic, Gate logic.

(Text Book-1)

Unit-IV:

Chip Input and Output circuits: ESD Protection, Input Circuits, Output Circuits and L(di/dt) Noise, On-Chip clock Generation and Distribution.

Design for Testability: Fault types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based Techniques and Built-In Self Test techniques.

(Text Book-2)

Unit-V:

FPGA Design: FPGA design flow, Basic FPGA architecture, FPGA Technologies, FPGA families- Altera Flex 8000FPGA, Altera Flex 10FPGA, Xilinx XC4000 series FPGA, Xilinx Spartan XL FPGA, Xilinx Spartan II FPGAs, Xilinx Vertex FPGA. Case studies: FPGA Implementation of Half adder and full adder.

Introduction to synthesis: Logic synthesis, RTL synthesis, High level Synthesis.

(Reference Text Book-1)

Unit-VI:

Introduction to Low Power VLSI Design: Introduction to Deep submicron digital IC design**,** Low Power CMOS Logic Circuits: Over view of power consumption, Low –power design through voltage scaling, Estimation and optimisation of switching activity, Reduction of switching capacitance. Interconnect Design, Power Grid and Clock Design.

(Text Book-2)

Text Books:

1. Essentials of VLSI Circuits and Systems - Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
2. CMOS Digital Integrated Circuits Analysis and Design- Sung-Mo Kang, Yusuf Leblebici, Tata McGraw-Hill Education, 2003.

References:

1. Advanced Digital Design with the Verilog HDL, Michael D.Ciletti, Xilinx Design Series, Pearson Education
2. Analysis and Design of Digital Integrated Circuits in Deep submicron Technology, 3'rd edition, David Hodges.

ROBOTICS
(Open Elective)

OBJECTIVES:
- To introduce the basic concepts, parts of robots and types of robots.
- To make the student familiar with the various drive systems for robot, sensors and their
  applications in robots and programming of robots.
- To discuss about the various applications of robots, justification and implementation of robot.

UNIT- I:
Introduction
Specifications of Robots- Classifications of robots – Work envelope - Flexible automation versus Robotic technology – Applications of Robots ROBOT KINEMATICS AND DYNAMICS Positions,

UNIT-II:
Orientations and frames, Mappings
Changing descriptions from frame to frame, Operators: Translations, Rotations and Transformations - Transformation Arithmetic - D-H Representation - Forward and inverse Kinematics Of Six Degree of Freedom Robot Arm – Robot Arm dynamics

UNIT- III:
Robot Drives and Power Transmission Systems
Robot drive mechanisms, hydraulic – electric – servomotor- stepper motor - pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Link - Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws,

UNIT -IV:
Manipulators
Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators

UNIT- V:
Robot End Effectors
Classification of End effectors – Tools as end effectors. Drive system for grippers- Mechanical adhesive-vacuum-magnetic-grippers. Hooks&scoops. Gripper force analysis and gripper design. Active and passive grippers.

UNIT -VI:
Path planning & Programming
Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion – straight line motion-Robot languages-computer control and Robot software.

OUTCOMES:
- The Student must be able to design automatic manufacturing cells with robotic control using
- The principle behind robotic drive system, end effectors, sensor, machine vision robot Kinematics and programming.

TEXT BOOKS:
1. Deb S. R. and Deb S., "Robotics Technology and Flexible Automation", Tata McGraw HillEducation Pvt. Ltd, 2010.
2. John J.Craig, "Introduction to Robotics", Pearson, 2009.
3. Mikell P. Grooveret. al., "Industrial Robots - Technology, Programming and Applications", McGraw Hill, New York, 2008.

REFERENCE BOOKS:
1. Richard D Klafter, Thomas A Chmielewski, Michael Negin, "Robotics Engineering
– An Integrated Approach", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd., 2006.
2. Fu K S, Gonzalez R C, Lee C.S.G, "Robotics: Control, Sensing, Vision and Intelligence", McGraw Hill, 1987

NEURAL NETWORKS AND FUZZY LOGIC
(Open Elective)

Preamble:

This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associate Memories and introducesFuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented. This subject is very important and useful for doing Project Work.

Learning Objectives:
- To understand artificial neuron models.
- To understand learning methods of ANN.
- To utilize different algorithms of ANN.
- To distinguish between classical and fuzzy sets.
- To understand different modules of fuzzy controller.
- To understand applications of neural networks and fuzzy logic.

Unit – I: Introduction to Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential, Applications of ANN.

Unit- II: Essentials of Artificial Neural Networks

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANNArchitectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

Unit–III:
Multilayer feed forward Neural Networks

Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements, Radial Basis Function (RBF) Neural Network – Kohonen Self Organising feature Map (KSOM).

Associative Memories

Bidirectional Associative Memories (BAM)-Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network, Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

Unit – IV: Classical & Fuzzy Sets

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

UNIT V: Fuzzy Logic Modules

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

UNIT VI: Applications

Neural network applications: Process identification, control, fault diagnosis and load forecasting.

Fuzzy logic applications: Load frequency control and Fuzzy classification.

Learning Outcomes:

Students should able to:
- Know different models of artificial neuron.
- Use learning methods of ANN.
- Use different paradigms of ANN.
- Classify between classical and fuzzy sets.
- Use different modules of Fuzzy logic controller.
- Apply Neural Networks and fuzzy logic for real-time applications.

Text Book:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by RajasekharanandRai – PHI Publication.
2. Introduction to Neural Networks using MATLAB 6.0 - S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH,2006

Reference Book:

1. Neural Networks – James A Freeman and Davis Skapura, Pearson Education, 2002.
2. Neural Networks – Simon Hakins , Pearson Education
3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.

ENERGY AUDIT, CONSERVATION & MANAGEMENT
(Open Elective)

Preamble:

This is an open elective course developed to cater the current needs of the industry. This course covers topics such as energy conservation act and energy conservation. It also covers energy efficient lighting design. The student will learn power factor improvement techniques, energy efficiency in HVAC systems. In addition The economic aspects such as payback period calculations, life cycle costing analysis is covered in this course.

Learning Objectives:
- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Unit–I:
Basic Principles of Energy Audit and management
Energy audit – Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts –Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

Unit–II:
Lighting
Modification of existing systems – Replacement of existing systems – Priorities**:** Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures.

Unit–III:
Power Factor and energy instruments
Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

Unit–IV:
Space Heating and Ventilation
Ventilation – Air–Conditioning (HVAC) and Water Heating**:** Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

Unit–V
Economic Aspects and Financial Analysis

Understanding energy cost - Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems.

Unit–VI:
Computation of Economic Aspects
Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value – Internal rate of return – numerical examples – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment – Numerical examples.

Learning Outcomes:
Student will be able to

- Explain energy efficiency, conservation and various technologies.
- Design energy efficient lighting systems.
- Calculate power factor of systems and propose suitable compensation techniques.
- Explain energy conservation in HVAC systems.
- Calculate life cycle costing analysis and return on investment on energy efficient technologies.

Text Books:
1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995

Reference Books:
1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
4. Energy management hand book by W.C.Turner, John wiley and sons.
5. Energy management and conservation –k v Sharma and pvenkataseshaiah-I K International Publishing House pvt.ltd,2011.
6. http://www.energymanagertraining.com/download/Gazette_of_IndiaPartIISecI-37_25-08-2010.pdf

MICRO MPROCESSORS AND MICRO CONTROLLERS LAB

Learning Objectives:
- To study programming based on 8086 microprocessor and 8051 microcontroller.
- To study 8086 microprocessor based ALP using arithmetic, logical and shift operations.
- To study to interface 8086 with I/O and other devices.
- To study parallel and serial communication using 8051& PIC 18 micro controllers.

Any 10 of the following experiments are to be conducted:

I. Microprocessor 8086&Microcontroller 8051

Introduction to MASM/TASM.
1. Arithmetic operation – Multi byte addition and subtraction, multiplication and division – Signed and unsigned arithmetic operation, ASCII – Arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix**:** Move block, Reverse string Sorting, Inserting, Deleting, Length of the string, String comparison.
4. Interfacing 8255–PPI
5. Interfacing 8259 – Interrupt Controller.
6. Interfacing 8279 – Keyboard Display.
7. Stepper motor control using 8253/8255.
8. Reading and Writing on a parallel port using 8051
9. Timer in different modes using 8051
10. Serial communication implementation using 8051
11. Understanding three memory areas of 00 – FF Using 8051 external interrupts.
12. Interface PIC 18 with an optoisolator
13. Interface PIC 18 with a DC motor

Learning Outcomes:
- Will be able to write assembly language program using 8086 micro based on arithmetic, logical, and shift operations.
- Will be able to interface 8086 with I/O and other devices.
- Will be able to do parallel and serial communication using 8051 & PIC 18 micro controllers.

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DATASTRUCTURES THROUGH C LAB

OBJECTIVES:

- To develop skills to design and analyze simple linear and non linear data structures

- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem

- To Gain knowledge in practical applications of data structures

List of Experiments:

1. Implementation of Singly linked list.

2. Implementation of Doubly linked list.

3. Implementation of Multistack in a Single Array.

4. Implementation of Circular Queue

5. Implementation of Binary Search trees.

6. Implementation of Hash table.

7. Implementation of Heaps.

8. Implementation of Breadth First Search Techniques.

9. Implementation of Depth First Search Techniques.

10. Implementation of Prim's Algorithm.

11. Implementation of Dijkstra's Algorithm.

12. Implementation of Kruskal's Algorithm

13. Implementation of MergeSort

14. Implementation of Quick Sort

15. Implementation of Data Searching using divides and conquers technique

OUTCOMES:

At the end of this lab session, the student will

- Be able to design and analyze the time and space efficiency of the data structure

- Be capable to identity the appropriate data structure for given problem

- Have practical knowledge on the application of data structures

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PROFESSIONAL ETHICSAND HUMAN VALUES

Course Objectives:

*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

UNIT I: Human Values:
Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty – Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT: II: Principles for Harmony:
Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT III: Engineering Ethics and Social Experimentation:
History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument –Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV: Engineers' Responsibilities towards Safety and Risk:
Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V: Engineers' Duties and Rights:
Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes-Industrial Espionage- Price Fixing-Whistle Blowing.

UNIT VI: Global Issues:

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

- Related Cases Shall be dealt where ever necessary.

Outcome:
***It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.**
***It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.**

References:

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi.
2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger - Tata McGraw-Hill – 2003.
3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana - Maruthi Publications.
4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.
7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran – University Science Press.
8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013
9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

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	Linear Algebra & Differential Equations	18ME1T02	2018-19
2	B.Tech Mechanical Engineering	Problem solving through C	18ME1T04	2018-19
3	B.Tech Mechanical Engineering	Problem solving through C Lab	18ME1L08	2018-19
4	B.Tech Mechanical Engineering	Vector Calculus and Fourier Transforms	18ME2T02	2018-19
5	B.Tech Mechanical Engineering	Biology for Engineers	18ME2T04	2018-19
6	B.Tech Mechanical Engineering	Engineering Graphics	18ME2T06	2018-19
7	B.Tech Mechanical Engineering	Basic Electrical & Electronics Engineering Lab	18ME2L08	2018-19
8	B.Tech Mechanical Engineering	Theory of Machines Lab	R1631036	2018-19
9	B.Tech Mechanical Engineering	Thermal Engineering Lab	R1631038	2018-19
10	B.Tech Mechanical Engineering	Computational Fluid Dynamics Lab	R1632038	2018-19
11	ME-M. Tech (Machine Design)	Advanced Stress Analysis	M18MD101	2018-19
12	ME-M. Tech (Machine Design)	Advanced Vibrations and Acoustics	M18MD102	2018-19
13	ME-M. Tech (Machine Design)	Advanced Machine Design	M18MD103	2018-19
14	ME-M. Tech (Machine Design)	Advanced Engineering Materials	M18MD106	2018-19
15	ME-M. Tech (Machine Design)	Machine dynamics lab	M18MD111	2018-19
16	ME-M. Tech (Machine Design)	Numerical Simulation lab	M18MD112	2018-19
17	ME-M. Tech (Machine Design)	Research Methodology and IPR	M18MD109	2018-19
18	ME-M. Tech (Machine Design)	Audit Course - 1(Constitution of India)	M18MD110	2018-19
19	ME-M. Tech (Machine Design)	Finite Element Method	M18MD201	2018-19
20	ME-M. Tech (Machine Design)	Computer Aided Design	M18MD202	2018-19
21	ME-M. Tech (Machine Design)	Robotics	M18MD204	2018-19
22	ME-M. Tech (Machine Design)	Optimization Techniques in Design	M18MD208	2018-19
23	ME-M. Tech (Machine Design)	Computer Aided Design lab	M18MD211	2018-19
24	ME-M. Tech (Machine Design)	Simulation lab	M18MD212	2018-19
25	ME-M. Tech (Machine Design)	Audit -2(Disaster Management)	M18MD209	2018-19
26	ME-M. Tech (Machine Design)	Mini-Project with Seminar	M18MD210	2018-19
27	ME-M. Tech (Machine Design)	Advanced Finite Element Method	M18MD301	2018-19

28	ME-M. Tech (Machine Design)	Operations Research	M18MD305	2018-19
29	ME-M. Tech (Machine Design)	Dissertation Phase – I	M18MD309	2018-19
30	ME-M. Tech (Machine Design)	Dissertation Phase – II	M18MD401	2018-19

I Semester

L	T	P	C
3	1	0	4

LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS (18ME1T02)

UNIT I: Linear systems of equations, Eigen values & Eigen vectors

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence, Consistency of linear system of equations, System of linear homogeneous equations. Gauss -Jordan method, LU decomposition method, **Application:** Finding the current in electrical circuits, Eigen values, Eigen vectors, Properties of Eigen values (without proofs).

UNIT II: Quadratic forms & Differential calculus:

Cayley-Hamilton theorem (without proof), Reduction to diagonal form, Reduction of quadratic form to canonical form, Nature of quadratic form. Limits and continuity and differentiability, Mean value theorems, Taylor's and Maclaurin's series. Functions of two variables, Partial derivatives, Homogeneous functions, Total derivative, Jacobian, Taylor's theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT III: Differential equations of first order:

Formation of a differential equation, Solution of a differential equation, Variables separable method, 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.

UNIT IV: Differential equations higher order:

Part –A : Definitions, Complete solution, Operator D, Rules to find Complementary function, Inverse operator, Rules to find the particular integral(RHS term of the type e^{ax} , Sin(ax+b), cos(ax+b), polynomials in x). Rules to find the particular integral (RHS term of the type e^{ax} V(x), any other function), Method of variation of parameters. **Application:** L-C-R circuits.

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

Text Books:

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

Reference Books:

1. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics,

Lakshmi Publications, 9th Edition, 2014.

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

I Semester

	L	T	P	C
	3	0	0	3

PROBLEM SOLVING THROUGH C (18ME1T04)

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.

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. Muti way decision making statements: else if, Switch statement

Looping 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. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Krnighan. B.W and Ritche, D.M, "The C Programming Language", Second Edition, Pearson Education, 2006
3. Pradep dey, Manas Ghosh, "Fundamentals of Computing and programming in C", First Edition, Oxford University Press, 2009.

References:

1. Paul Deitel and Harvey Deitel, "C How to Program", Seventh Edition, Pearson Publication.
2. E Balagursamy, "Programming in C, Sixth Edition, Tata McGraw Hill.
3. Ajay Mittal, "Programming in C A practical Approach", Pearson education

I Semester	L	T	P	C
	0	0	3	1.5

PROBLEM SOLVING THROUGH C LAB (18ME1L08)

1.   Write a C program to convert temperature from Fahrenheit to Celsius.

     Write a C program to find the roots of a quadratic equation.

     Write a program to implement simple calculator using switch case

2.   Write a C program to determine if the given number is a prime number or not.

     Write a program to display the factorial of a given number

3.   Write a program to display whether a given is Armstrong or not

     Write a C program to generate the first n terms of the Fibonacci sequence.

4.   Write a C program to display the reverse of a given number.

     Write a C program to calculate the following sin and cos value

5.   Write a program for sorting numbers in a list.

6.   Write programs for searching a number in the list using

     a.Linear search

     b.Binary search

7.   Write programs that reads two matrices to perform the following:

     a.Addition of two matrices

     b.Multiplication of two matrices

8.   Write a program to perform the following operations without using build in string operations:

     a.To display the length of the string.

     b.To check whether the string is palindrome or not

     c.To delete n characters from a given position in a given string.

9.   Write a program to generate GCD of two numbers using functions

10. Write a C program that reads two integers n and r to compute the ncr value using the following relation: ncr(n, r) = n! / r! (n,r)! . Use a function for computing the factorial value of an integer.

11. Write programs for the following using recursive functions

     a.Factorial of a given number

     b.GCD of two numbers

     c. Fibonacci series

12. Write a program to demonstrate call by value and call by reference.

13. Write a program to perform following operating using pointers

     a.Reverse of a string

     b.Comparison of two strings

14. Write a program for displaying the details of the student by sorting them according to the marks using structure containing roll no, name and marks.

15. Write a program for merging two files

16. Write a program to count no of lines, words, characters in a file
17. C Program to Create Employee File Name Record that is taken from the Command Line Argument

II Semester

	L	T	P	C
	3	0	0	3

VECTOR CALCULUS AND FOURIER TRANSFORMS (18ME2T02)

UNIT I: SPECIAL FUNCTIONS & MULTIPLE INTEGRALS:

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

Multiple Integrals: Double integrals in Cartesian & polar coordinates, Change of order of integration, Triple integrals, Change of variables (Cartesian to Polar, Cartesian to Cylindrical & Cartesian to Spherical polar coordinate systems).

Applications: Area enclosed by plane curves, Volume of solids.

UNIT II: VECTOR CALCULUS:

Vector Differentiation: Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, Del applied to vector point functions-Div& Curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

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

UNIT III: FOURIER SERIES:

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

UNIT IV: FOURIER TRANSFORMS:

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

UNIT V: APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS:

Definition of PDE, Classification of 2nd order PDE, Variable separable method, Vibrations of a stretched string – Wave equation. One-dimensional heat flow, Two-dimensional heat flow, Solution of Laplace's equation.

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. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics,

Lakshmi Publications, 9th Edition, 2014.

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

II Semester	L	T	P	C
	2	0	0	2

BIOLOGY FOR ENGINEERS (18ME2T04)

UNIT-1: INTRODUCTION

Importance and need of biology- Discoveries of biology in 18th Century: Brownian motion and the origin of thermodynamics- their importance in any scientific inquiry. Classification of organisms based on (a) Cellularity- Unicellular or Multicellular , (b) Ultra structure- prokaryotes or eucaryotes. (c) Energy and carbon utilization -autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitat- acquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life.

UNIT-2: BIOMOLECULES

Introduction to molecules of life-monomeric units and polymeric structures of carbohydrates, Sugars, starch and cellulose, amino acids and proteins structure and function. Nucleotides and DNA/RNA, Hierarchy of DNA Structure- from single stranded to double helix, two carbon units and lipids.

UNIT-3: ENZYMES & METABOLISM

Enzyme classification, mechanism of enzyme action, enzyme kinetics and kinetic parameters. Thermodynamics as applied to biological systems, endergonic and exergoinc reactions, Concept of kinetic equilibrium and its relation to standard free energy Spontaneity, ATP as an energy currency, Glycolysis, Krebs cycle and Energy yielding and energy consuming reactions.

UNIT-4: INFORMATION TRANSFER

Concept of genetic code. Molecular basis of information transfer; Transcription and translation.

UNIT-5: MICROBIOLOGY

Concept of species and strains, Identification of Microorganisms.   Sterilization and media compositions, Growth kinetics.

TEXT/REFERENCE BOOKS:

1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd.
2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons
3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company

4. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher

5. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

II Semester	L	T	P	C
	3	0	0	3

ENGINEERING GRAPHICS (18ME2T06)

UNIT I:

Lettering, Dimensioning, Geometrical Constructions. Polygons: General construction method, Inscribing and describing methods. Cycloids: Cycloid, Epicycloid, Hypocycloid and Involutes-Tangent and Normals to the above curves.

UNIT II :

Orthographic projections: Introduction, Projections of points. Projections of straight lines- parallel to both the planes, parallel to one plane and inclined to the other plane. Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT III

Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane, Projections of planes inclined to both the reference planes.

UNIT IV:

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the reference planes.

Sections of solids: Prisms, Pyramids, Cones and Cylinders in simple positions.

UNIT V:

Isometric Projections: Isometric views/projections of planes and simple solids, Conversion of orthographic views to isometric views. Conversion of isometric views to orthographic views. Introduction to AutoCAD

Text Books:

1. Engineering Drawing, N. D. Butt, Chariot Publications
2. Engineering Drawing +Auto CAD, K Venugopal &V Prabhuraja, Newage Publishers.

Reference Books:

1. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
2. Engineering Graphics for Degree, K. C. John, PHI Publishers
3. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
4. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

II Semester

L	T	P	C
0	0	2	1

BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB (18ME2L08)

LIST OF EXPERIMENTS

1. Study of different switches, MCBs, measuring instruments, wires and cables.

2. Identification and measurement of resistance, inductance & capacitance.

3. Practice house wiring with MCB, 3 pin socket, 2 way control of lamp.

4. Load test on DC shunt motor

5. Load test on DC shunt Generator

6. Constructional study of machine and engine parts using their cut sections.

7. Identification and testing of different electronic devices like diode, BJT, FET, SCR, IGBT, MOSFET, UJT etc.,

8. Practice soldering with simple electronic components on PCB.

9. V-I Characteristics of PN junction diode

10. Characteristics of Bipolar Junction Transistor

ACADEMIC REGULATIONS

(MIC18)

COURSE STRUCTURE

&

SYLLABUS

For

MASTER OF TECHNOLOGY

(M.Tech)

ME/MACHINE DESIGN

(Applicable for batches admitted from 2018-19 onwards)

Devineni Venkata Ramana & Dr. Himasekhar
MIC College of Technology
An Autonomous Institution
Approved by AICTE, Permanently Affiliated to: JNTUK, Kakinada
Kanchikacherla - 521180, Krishna Dist, A.P, India.

DEPARTMENT OF MECHANICAL ENGINEERING

PROPOSED COURSE STRUCTURE (Autonomous) for M. Tech (Machine Design)

I Year I Semester

S.No	Course Code	Course Title	Hours Per Week			Total Contact Hours	Credits
			L	T	P		
1	18311T01	Advanced Stress Analysis	3	---	---	3	3
2	18311T02	Advanced Vibrations and Acoustics	3	---	---	3	3
3	18311T03	1.Advanced Machine Design	3	---	---	3	3
	18311T04	2.Design for Manufacturing and Assembly					
	18311T05	3.Mathematical Methods in Engineering					
4	18311T06	1.Advanced Engineering Materials	3	---	---	3	3
	18311T07	2.Mechanics of Composite Materials					
	18311T08	3.Analysis and Synthesis of Mechanisms					
5	18311L11	Machine dynamics lab	---	---	4	4	2
6	18311L12	Numerical Simulation lab	---	---	4	4	2
7	18311T09	Research Methodology and IPR	2	---	---	2	2
8	18311T10	Audit Course – 1	2	---	---	2	0
		TOTAL	16	---	8	24	18

I Year II Semester

S.No	Course Code	Course Title	Hours Per Week			Total Contact Hours	Credits
			L	T	P		
1	18312T01	Finite Element Method	3	---	---	3	3
2	18312T02	Computer Aided Design	3	---	---	3	3
3	18312T03	1. Tribology in Design	3	---	---	3	3
	18312T04	2. Robotics					
	18312T05	3. Fracture Mechanics					
4	18312T06	1. Multi-body Dynamics	3	---	---	3	3
	18312T07	2. Condition Based Monitoring					
	18312T08	3. Optimization Techniques in Design					
5	18312L11	Computer Aided Design lab	---	---	4	4	2
6	18312L12	Simulation lab	---	---	4	4	2
7	18312T09	Audit Course-2	2	---	---	2	0
8	18312P10	Mini-Project with Seminar	---	---	4	4	2
		TOTAL	14	---	12	26	18

(Dr V.S.SAI)

(K.SRINIVAS)   (Dr.G-RAJESH)   R.fenith   (P.Bhagat Singh)

II Year III Semester

S.No	Course Code	Course Title	Hours Per Week			Total Contact Hours	Credits
			L	T	P		
1	18313T01	1. Advanced Finite Element Method	3	---	---	3	3
	18313T02	2. Advanced Metallurgy					
2	18313T03	1. Business Analytics	3	---	---	3	3
	18313T04	2. Industrial Safety					
	18313T05	3. Operations Research					
	18313T06	4. Cost Management of Engineering Projects					
	18313T07	5. Composite Materials					
	18313T08	6. Waste to Energy					
3	18313P08	Dissertation Phase – I	---	---	20	20	10
		TOTAL	6	---	20	26	16

II Year IV Semester

S. No	Course Code	Course Title	Hours Per Week			Total Contact Hours	Credits
			L	T	P		
1	18314P01	Dissertation Phase – II	---	---	32	32	32
		TOTAL	---	---	32	32	16

Audit course 1 & 2

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development through Life Enlightenment Skills.

V. (Dr V. B. SAI)

(CK. SRINIVAS)

(Dr G RAJESH)

(R.Bhagat Singh)

Detailed Syllabus

L T P C

3 - - 3

Advanced Stress Analysis (18311T01)

Ting Scheme

Lectures: 3Hrs/week

Course Outcomes:

At the end of the course:

1. Students will understand the tonsorial approach of continuum mechanics and comprehend modern research material.

2. Student will learn basic field equations such as equilibrium equations, compatibility and constitutive relationship.

3. Students will be able to apply basic field equations to torsion, bending and two dimensional elasticity problems, and energy methods.

4. Students will be able to solve problems in unsymmetrical bending and shear center, contact stresses and pressurized cylinders and rotating discs.

Syllabus Contents

Unit 1: Theory of Elasticity

Analysis of stress, Analysis of stain, Elasticity problems in two dimension and three dimensions, Mohr's circle for three dimensional stresses. Stress tensor, Air's stress function in rectangular and polar coordinates.

Energy Methods-Energy method for analysis of stress, strain and deflection The three theorem's -theorem of virtual work, theorem of least work, Castiglioni's theorem, Rayleigh Ritz method, Galekin's method, Elastic behavior of anisotropic materials like fiber reinforced composites.

Unit 2. Theory of Torsion

Torsion of prismatic bars of solid section and thin walled section. Analogies for torsion, membrane analogy, fluid flow analogy and electrical analogy.

Torsion of conical shaft, bar of variable diameter, thin walled members of open cross section in which some sections are prevented from warping, Torsion of noncircular shaft.

Unit 3. Unsymmetrical Bending and Shear Centre

Concept of shear center in symmetrical and unsymmetrical bending, stress and deflections in beams subjected to unsymmetrical bending.

shear center for thin wall beam cross section, open section with one axis of symmetry, general open section, and closed section. .

Unit 4. Pressurized Cylinders and Rotating Disks

Governing equations, stress in thick walled cylinder under internal and external pressure, shrink fit compound cylinders. Stresses in rotating flat solid disk, flat disk with central hole, disk with variable thickness, disk of uniform strength, Plastic action in thick walled cylinders and rotating disc.

Unit 5.

Contact stresses:Geometry of contact surfaces, method of computing contact stresses and deflection of bodies in point contact, stress for two bodies in line contact with load normal to contact area and load normal and tangent to contact area.Introduction to Analysis of low speed impact.

TEXT BOOKS:

1. Sadd, Martin H., Elasticity: Theory, applications and Numeric, Academic Press 05 (Text Book)
2. Boresi, A.P. and K. P. Chong, Elasticity in Engineering Mechanics, Second Edition,John Wiley & Sons, 00.

REFERENCES:

1. Budynas, R. G. Advance strength and Applied Stress Analysis, Second Edition, WCB/ McGraw Hill 1999
2. Dally, J. W. and W.F. Riley, Experimental Stress Analysis, McGraw Hill International,Third Edition, 1991
3. Theory of Elasticity – Timoshenko and Goodier, Mc Graw Hill
4. Advanced Strength of Materials, Vol. 1,2 – Timoshenko, CBS
5. Advanced Strength of Materials – Den Harteg

L   T   P   C
3   -   -   3

Advanced Vibrations and Acoustics (18311T02)

Ting Scheme
Lectures: 3 hrs/week

Course Outcomes:
At the end of the course:

1. The student will be able to predict response of a SDOF system, damped or undamped, subjected to simple arbitrary base or force excitations. They will be able to obtain Shock Response Spectrum of SDOF systems for such excitations and understand use of the SRS.

2. The students will be able to write differential equations of motion for MDOF systems, and

   through the technique of decoupling and orthogonal properties of natural modes, should be able to obtain the Eigen-values and mode shapes of natural vibrations and response to harmonic and arbitrary excitations.

3. The students will be able to obtain the Eigen-values and mode shapes of natural vibrations of beams and response to harmonic excitations using orthogonal properties of natural modes.

4. Student will be able to obtain natural frequencies and mode shapes of MDOF and continuous systems using computational methods such as Rayleigh-Ritz method, Holzer method, Dunckerley's method, and Stodola's method.

5. Student will know various terminologies used in acoustics and acoustic wave transmission, derive plane and spherical wave equations, and obtain sound pressure level at a given distance from a simple sound source of known strength.

   Students should understand the basics of psychoacoustics, equal loudness contours, dBA scale, loudness, pitch and timbre.

Syllabus Contents:

Unit 1:
Transient Vibrations, Response of a single degree of freedom system to step and any arbitrary excitation.Convolution (Duhamel's) integral, impulse response function

Unit 2:
Multi degree of freedom systems, Free, damped and forced vibrations of two degree of freedom systems, Eigen values and Eigen vectors, normal modes and their properties, mode summation method.Use of Lagrange's equations to derive the equations of motion,

Unit 3:
Continuous Systems, Natural Vibrations of beams – Differential equation of motion, solution by the method of separation of variables, frequency parameter, natural frequencies and mode shapes, forced vibration of simply supported beam subjected to concentrated harmonic force at a point, Mode summation method.Discretized models of continuous systems and their solutions using Rayleigh – Ritz method.

Unit 4:

Vibration Control, Methods of vibration control, principle of superposition, Numerical and computer methods in vibrations:Rayleigh, Rayleigh-Ritz and Dunkerley's methods, matrix iteration method for Eigen-value calculations, Holzer's method.

Unit 5:

Plane acoustic waves, Sound speed, characteristic acoustic impedance of elastic media, sound intensity, dB scale, Transmission Phenomena, transmission from one fluid medium to another,normal incidence, reflection at the surface of a solid, standing wave patterns, Symmetric Spherical waves, near and far fields, simple models of sound sources, sound power,determination of sound power and intensity levels at a point due to a simple source.Psychoacoustics, Speech, mechanism of hearing, thresholds of the ear – sound intensity and frequency, loudness, equal loudness levels, loudness, pitch and timbre, beats, masking by pure tones, masking by noise.

TEXT BOOKS:

1.Thomson W.T., "Theory of Vibrations with applications", George Allen and Unwh Ltd.London, 1981.

2.S.S. Rao, Addison, "Mechanical Vibrations", Wesley Publishing Co., 1990.

References:

1.Leonard Meirovitch, "Fundamentals of vibrations", McGraw Hill International Edition.
2.S. Timoshenko, "Vibration problems in Engineering", Wiley, 1974.
3.Lawrence E. Kinsler and Austin R.Frey, "Fundamentals of acoustics", Wiley Eastern Ltd.,1987.
4.Michael Rettinger, "Acoustic Design and Noise Control", Vol. I & II. , Chemical Publishing Co., New York, 1977.

I YEAR -I SEMESTER

L	T	P	C
3	-	-	3

Advanced Machine Design (18311T03)

Ting Scheme
Lectures: 3 hrs/week

Course Outcomes:
At the end of the course:

1. Students will realize that creativity, manufacturability, assembly, maintainability, emotions, reliability are also important aspects of design other than finding dimensions and stresses in the highly competitive, dynamic and customer centered market.
2. Students will demonstrate the ability to identify needs of the customer and convert them in to technical specifications of a product.
3. Students will be able to generate different ideas after identifying the need and determining the specifications and constraints of a product for a particular purpose.
4. Students will understand the principals used while designing for manufacture, assembly, emotions and maintenance.
5. Students will know various methods of rapid prototyping the products to test and modify the designs.
6. Students will be able to design the components considering strength based reliability.

Syllabus Contents:

Unit 1: Development processes and organizations,Product Planning.

Unit2: Need Identification and problem definition, product specification, concept generation and selection. Evaluation, creativity methods, Concept testing.

Unit 3: Design for manufacture, assembly, maintenance,Casting, forging.

Unit4: Design for Reliability, strength based reliability.Parallel and series systems, robust design.

Unit 5: Industrial design: Design for Emotion and experience, Introduction to retrofit and Eco design, Human behavior in design, Rapid Prototyping.

TEXTBOOKS:
1. George E Dieter, "Engineering Design", McGraw Hill Company, 00.

Advanced Engineering Materials (18311T06)

Ting Scheme
Lectures: 3 hrs/week

Course Outcomes:
At the end of the course the student will
1. Demonstrate an understanding of mechanics, physical and chemical properties of materials including metals, ceramics, polymers and composites
2. Understand existence of imperfections and their effects on mechanical properties of materials and cause of failure
3. Demonstrate understanding of phase diagrams and their use in predicting phase transformation and microstructure
4. Understand and predict various types of failures using concept of fracture mechanics, creep and effect of impact
5. Know Electrical, Thermal, Optical and Magnetic Properties of metals, ceramics, polymers and composites
6. Understand the economic considerations in usage and recycling of materials in human use.

Syllabus Contents:

Unit 1. Introduction, Atomic Structure, Interatomic Bonding and Structure of Crystalline solids: Historical perspective of Materials Science. Why study properties of materials? Classification of materials. Advanced Materials, Future materials and modern materials, Atomic structure. Atomic bonding in solids, Crystal structures, Crystalline and noncrystalline materials. Miller indices. Anisotropic elasticity. Elastic behavior of composites. Structure and properties of polymers. Structure and properties of ceramics.

Unit 2:
Phase Diagrams, Imperfections in Solids and Diffusions
Introduction to Phase Diagrams Equilibrium phase diagrams- The iron-carbon system. Phase transformations. Transformation rate effects and TTT diagrams. Microstructure and property changes in iron- carbon system Point defects. Theoretical yield point.Line defects and dislocations. Interfacial defects. Bulk or volume defects. Atomic vibrations; Diffusion mechanisms. Steady and non-steady state diffusion. Factors that influence diffusion Non-equilibrium transformation and microstructure.

Unit 3:
Mechanical Behaviour of Metals and Diffusion Mechanisms: Elastic deformation. Plastic deformation. Interpretation of tensile stress-strain curves Yielding under multiaxial stress. Yield criteria and macroscopic aspects of plastic deformation. Property variability and design factors, Dislocation and plastic deformation. Mechanisms of strengthening in metals. Recovery, recrystallization and grain growth. Strengthening by second phase particles. Optimum distribution of particles. Lattice resistance to dislocation motion.Mechanical Strengthening Mechanisms- Particle strengthening by precipitation. Precipitation reactions.

Kinetics of nucleation and growth. **Failure:** Fracture. Ductile and brittle fracture. Fracture mechanics. Impact fracture. Ductile brittle transition. Fatigue. Crack initiation and propagation. Crack propagation rate. Creep. Generalized creep behavior. Stress and temperature effects.

Unit 4:

Applications and Processing of Metals and Alloys, Polymers, Ceramics, and composites:

Types of metals and alloys. Fabrication of metals. Thermal processing of metals. Heat treatment. Precipitation hardening. Types and applications of ceramics. Fabrication and processing of ceramics, Mechanical behaviour of polymers.Mechanisms of deformation and strengthening of polymers. Crystallization, melting and glass transition. Polymer types. Polymer synthesis and processing, Particle reinforced composites. Fibre reinforced composites. Structural composites.

Unit 5.

Electrical, Thermal, Optical and Magnetic Properties and economic Considerations:

Electrical conduction. Semi conductivity. Super conductivity. Electrical conduction in ionic ceramics and in polymers. Dielectric behaviour. Ferroelectricity. Piezoelectricity Heat capacity. Thermal expansion. Thermal conductivity. Thermal stresses Diamagnetism and Para magnetism. Ferromagnetism. Anti-ferromagnetism and ferrimagnetism.Influence of temperature on magnetic behaviour. Domains and Hysteresis,Basic concepts. Optical properties of metals. Optical properties of non-metals. Application of optical phenomena. Economic, Environmental and Social Issues of Material Usage - Economic considerations. Environmental and societal considerations. Recycling issues. Life cycle analysis and its use in design

TEXT BOOKS:

1.Materials Science and Engineering, William D. Callister, Jr, John Wiley & sons, 07
2.Modern Physical Metallurgy and Material Engineering, Science, Process, application, Smallman R.E., Bishop R J, Butterworth Heinemann, Sixth Ed., 1999.

REFERENCES:

1. Nano material by A.K. Bandyopadyay, New age Publishers.

2. Material science and Technology- Cahan.

3. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press.

4. R. M. Jones, Mechanics of Composite Materials, Mc Graw Hill Company, New York, 1975.

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Lab –I (18311L11) and Lab-II (18311L12)

Ting Scheme

Lectures: 4 hrs/week

Course Outcomes:
At the end of the course:
1. Students will be able to use various experimental techniques relevant to the subject.
2. Students will acquire hands on experience on the various test-rigs, Experimental set up.
3. Students will be able to function as a team member
4. Students will develop communication skills.
5. Students will be able to write technical reports.
6. Students will be able to use different software's.

Syllabus Contents:
The lab practice consists of experiments, tutorials and assignments decided by the course supervisors of the program core courses and program specific elective courses.

Lab-1: Machine dynamics lab

EXPERIMENTS:
1. Determination of damped natural frequency of vibration of the vibrating system with different viscous oils
2. Determination of steady state amplitude of a forced vibratory system
3. Static balancing using steel balls & Determination of the magnitude and orientation of the balancing mass in dynamic balancing
4. Field balancing of the thin rotors using vibration pickups.
5. Determination of the magnitude of gyroscopic couple, angular velocity of precession, and representation of vectors.
6. Determination of natural frequency of given structure using FFT analyzer
7. Diagnosis of a machine using FFT analyzer.
8. .Direct kinematic analysis of a robot
9. Inverse kinematic analysis of a robot
10 An experiment on friction, wear, pin-on-disc
11. An experiment on stress intensity factors / fatigue, fracture
12. Modal analysis of beams and plates

Lab-2: Numerical Simulation lab

Introduction to MATLAB and practice, Practice session on handling basic arithmetic etc, Writing codes with control loops, functions and scripts, Developing codes for visualization and plotting, Solving problems involving linear and nonlinear equations, Solving problems involving curve fitting and interpretations, Solving problems involving ordinaryal equation and partial differential equations, Solving case studies and working on projects

Research Methodology and IPR (18311T09)

Teaching Scheme
Lectures: 1hrs/week
Course Outcomes:

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

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

Syllabus Contents:

Unit 1: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

Unit 2: Effective literature studies approaches, analysis Plagiarism, Research ethics,

Unit 3: Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

Unit 4: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

Unit 5: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.New Developments in . IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"

2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction".

REFERENCES:

1. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"

2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.

3. Mayall , "Industrial Design", McGraw Hill, 1992

4. Niebel , "Product Design", McGraw Hill, 1974.

5. Asimov , "Introduction to Design", Prentice Hall, 1962.

6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

7. T. Ramappa, "Intellec tual Property Rights Under WTO", S. Chand, 2008

I YEAR -II SEMESTER   L T P C
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Finite Element Method(18312T01)

Ting Scheme
Lectures: 3 hrs/week

Course Outcomes:

At the end of the course,
For one and two dimensional, linear, static and dynamic problems in Structural Mechanics and Heat Transfer, the student will be able to demonstrate the learning outcomes as mentioned below:

1.The student will be able to classify a given problem on the basis of its dimensionality as 1-D, 2-D, or 3-D, time-dependence as Static or Dynamic, Linear or Non-linear.

2.The students will be able to develop system level matrix equations from a given mathematical model of a problem following the Galerkin weighted residual method or principle of stationary potential.

3. The student will be able to state three sources of errors in implementing FEM and suggest remedies to minimize the same for a given problem, viz. Modeling errors, Approximation errors, and numerical errors.

4. The student will be able to obtain consistent and lumped mass matrices for axial vibration of bars and transverse vibration of beams and obtain fundamental frequency of natural vibration using the methods mentioned in the curricula.

5.The students will be able use MATLAB for implementation of FEM to obtain elongations at nodes of a bar subjected to traction and concentrated loads and prescribed boundary conditions

6.The students will be able to use commercial software like ANSYS or ABAQUS for implementation of FEM to obtain stress concentration due to a small hole in a rectangular plate subjected to traction on edges and concentrated loads at points on the edges and prescribed boundary conditions.

Syllabus Contents:

Unit 1: Introduction, Classification of problems – Dimensionality, time dependence, Boundary Value problems, Initial value problems, Linear/Non-linear, etc,Differential equation as the starting point for FEM, steps in finite element method,discretization, types of elements used, Shape functions, Linear Elements, Local and Global coordinates, Coordinate transformation and Gauss-Legendre scheme of numerical integration, Nodal degrees of freedom,

Unit 2: Finite element formulation, variational, weighted residual and Virtual work methods.

Unit 3: 1-D and 2-D problems from Structural Mechanics – Bar, Beam, Plane stress and plane strain problems.Axisymmetric problems – Axi-symmetric forces and geometry.

Unit 4: computer implementation, higher order elements, Iso-parametric formulation,

Unit 5: Eigen-value problems, Natural vibration of bars and beams, Methods to find eigen-values and eigen-vectors.

TEXT BOOKS:

1. Chandrupatla and Belegundu "Introduction to Finite Elements in Engineering", Prentice Hall of India Pvt. Ltd. New Delhi, Ed.4, 11.

2. Logan Deryl L., "A First Course in Finite Element Method", Thomson Brook/Cole, 5th Ed.12.

REFERENCES:

1. Cook R.D. "Concepts and applications of finite element analysis" Wiley, New York, 4th Ed. 02.
2. Reddy J N, "Finite element Method", Tata McGraw Hill publishing Co Ltd, New Delhi, 3rd Ed., 05
3. Bathe K.J., Cliffs, N.J. "Finite Element Procedures in Engineering Analysis", PHI Learning, Eastern Economy Editions, 09.

I YEAR -II SEMESTER

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Computer Aided Design(18312T02)

Ting Scheme
Lectures: 3 hrs/week

Course Outcomes:

At the end of the course:
1. Have a conceptual understanding of the principles of CAD systems, the implementation of these principles, and its connections to CAM and CAE systems.
2. Understand 2D, 3D transformations and projection transformations
3. Get knowledge of various approaches of geometric modeling
4. Understand mathematical representation of 2D and 3D entities
5. Understand basic fundamentals of FEM

Syllabus Contents:

Unit 1: CAD Hardware and Software, Types of systems and system considerations, input and output devices, hardware integration and networking, hardware trends, Software modules,Computer Communications, Principle of networking, classification networks, network wring, methods, transmission media and interfaces, network operating systems,

Unit 2: Computer Graphics Introduction, transformation of geometric models: translation, scaling, reflection, rotation, homogeneous representation.Concatenated transformations; mappings of geometric models, translational mapping rotational mapping, general mapping, mappings as changes of coordinate system; inverse transformations and mapping.

Unit 3 : Projections of geometric models, orthographic projections, Geometric Modeling, curve representation.Parametric representation of analytic curves, parametric representation of synthetic curves, curve manipulations. Surface representation.

Unit 4 : Fundamentals of solid modeling, boundary representation (B-rep), Constructive Solid Geometry (CSF), sweep representation.Analytic Solid Modeling (ASM), other representations; solid manipulations, solid modeling based applications: mass properties calculations, mechanical tolerancing, etc.

Unit 5: Finite Element Modeling and Analysis, Finite Element Analysis, finite element modeling, mesh generation mesh requirements, semiautomatic methods, fully automatic methods, design and engineering applications.System Simulation, Need of simulation, areas of applications, when simulation is appropriate tool / not appropriate, concept of a system, components of a system, discrete and continuous systems, model of a system, types of models, types of simulation approaches.

TEXT BOOKS:

1. Ibrahbim Zeid, "CAD / CAM Theory and Practice".
2. Jim Browne, "Computer Aided Engineering and Design".

REFERENCES:

1 P. Radhakrishnan / V. Raju / S. Subramanyam, "CAD / CAM / CIM".
2. P.N. Rao, "CAD / CAM principles and applications", Tata Mcraw-Hill, 02.
3. Rogers / Adams, "Mathematical Elements for Computer Graphics".
4. Rooney and Steadman, "Principles of Computer Aided Design", Aug. 1993.
5. Jerry Banks / John Carson / Barry Nelson / David Nicol, "Discrete-Event System Simulation"

Robotics (18312T04)

Ting Scheme
Lectures: 3 hrs/week

Course Outcomes:

At the end of the course students will be able to

1. understand basic terminologies and concepts associated with Robotics and Automation
2. Demontrate comprehension of various Robotic sub-systems
3. Understand kinematics and dynamics to explain exact working pattern of robots
4. Aware of the associated recent updates in Robotics.

Syllabus Contents

Unit 1:

Introduction, Basic Concepts such as Definition, three laws, DOF, Misunderstood devices etc., Elements of Robotic Systems i.e. Robot anatomy, Classification, Associated parameters i.e. resolution, accuracy, repeatability, dexterity, compliance, RCC device, etc. Automation - Concept, Need, Automation in Production System, Principles and Strategies of Automation, Basic Elements of an Automated System, Advanced Automation Functions, Levels of Automations, introduction to automation productivity.

Unit 2 Robot Grippers:

Types of Grippers , Design aspect for gripper, Force analysis for various basic gripper system.Sensors for Robots:- Characteristics of sensing devices, Selections of sensors, Classification and applications of sensors. Types of Sensors, Need for sensors and vision system in the working and control of a robot.

Unit 3   Drives and control systems: Types of Drives, Actuators and its selection while designing a robot system. Types of transmission systems,Control   Systems   -Types   of Controllers,   Introduction   to   closed   loop   control Control Technologies in Automation:-   Industrial   Control   Systems,   Process   Industries   Verses Discrete-Manufacturing Industries, Continuous Verses Discrete Control, Computer Process and its Forms. Control System Components such as Sensors, Actuators and others.

Unit 4 Kinematics:. Transformation matrices and their arithmetic, link and joint description, Denavit – Hartenberg parameters, frame assignment to links, direct kinematics, kinematics redundancy, kinematics calibration, inverse kinematics, solvability, algebraic and geometrical methods. Velocities and Static forces in manipulators:- Jacobians,

singularities, static forces, Jacobian in force domain. **Dynamics-**
Introduction to Dynamics , Trajectory generator.

Unit 5 Machine Vision System: Vision System Devices, Image acquisition, Masking, Sampling and quantisation, Image Processing Techniques, Noise reduction methods, Edge detection, Segmentation.Robot Programming :- Methods of robot programming, lead through programming, motion interpolation, branching capabilities, WAIT, SIGNAL and DELAY commands, subroutines, Programming Languages: Introduction to various types such as RAIL and VAL II etc, Features of type and development of languages for recent robot systems.

TEXT BOOKS:

1. John J. Craig, Introduction to Robotics (Mechanics and Control), Addison-Wesley,2ndEdition, 04
2. Mikell P. Groover et. Al., Industrial Robotics: Technology, Programming and Applications, McGraw – Hill International, 1986.

REFERENCE :

1. S h i m o n Y. Nof, Handbook of Industrial Robotics , John Wiley Co, 01.
2. Automation, Production Systems and Computer Integrated Manufacturing, M.P. Groover, Pearson Education.
3. Industrial Automation: W.P. David, John Wiley and Sons.
4. Richard D. Klafter , Thomas A. Chemielewski, Michael Negin, Robotic Engineering An Integrated Approach , Prentice Hall India, 02.
5. Handbook of design, manufacturing & Automation: R.C. Dorf, John Wiley and Sons.

I YEAR -II SEMESTER   L   T   P   C
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Optimization Techniques in Design ((18312T08)
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Ting Scheme
Lectures: 3 hrs/week

Course Outcomes:

At the end of the course:

1. Students will know the principles of optimization.

    2. Students will have knowledge of algorithms for design optimization
    3. Students will be able to formulate an optimization problem.
    4. Students should be able to find the optimum solution of their problems
using optimization techniques.

Syllabus Contents:

Unit 1:Introduction to optimization, classification of optimisation problems.
Classical optimization techniques,

Unit 2:Linear programming, simplex method and Duality in linear programming.
Sensitivity or post-optimality analysis, Karmarkar's methods.

Unit 3:Non-Linear Programming: - One dimensional minimization.
Unconstrained and constrained minimization, direct and indirect methods.

Unit 4:Geometric programming,Optimum design of mechanical elements like beams,
columns and gears, shafts, etc.

Unit 5:Introduction to Genetic Algorithms, Operators and Applications to engineering
optimization problems.

TEXT BOOKS:
1. S. S. Stricker, "Optimising performance of energy systems" Battelle Press, New
York,1985.
2. R.C. Johnson, "Optimum Design of Mechanical Elements", Willey, New York, 1980.

REFERENCES:
1. J. S. Arora, "Introduction to Optimum Design", McGraw Hill, New York, 1989.
2. Kalyanmoy Deb, "Optimization for Engineering Design", Prentice Hall of India, New
Delhi, 05
3. L.C.W. Dixon, "Non-Linear Optimisation - Theory and Algorithms", Birkhauser,
Boston, 1980.
4. R.J. Duffin, E.L. Peterson and C.Zener "Geometric Programming-Theory and
Applications", Willey, New York, 1967.

Lab – III ((18312L11) and Lab-IV ((18312L12)

Ting Scheme

Lectures: 4 hrs/week
Course Outcomes:
At the end of the course:
1. Students will be able to use various experimental techniques relevant to the subject.
2. Students will acquire hands on experience on the various test-rigs, Experimental set up.
3. Students will be able to function as a team member
4. Students will develop communication skills.
5. Students will be able to write technical reports.
6. Students will be able to use different software's. **Syllabus Contents:**

Lab-III: Computer Aided Design lab
1. CAD Introduction.
2. Sketcher
3. Solid modeling –Extrude, Revolve, Sweep, etc and Variational sweep, Loft ,etc,
4. Surface modeling –Extrude, Sweep, Trim ..etc and Mesh of curves, Free form etc,
5. Feature manipulation – Copy, Edit, Pattern, Suppress, History operations etc,
6. Assembly-Constraints, Exploded Views, Interference check,
7. Drafting-Layouts, Standard & Sectional Views, Detailing & Plotting.
8. Exercises in Modeling and drafting of Mechanical Components – Assembly using Parametric and feature based Packages like PRO-E / SOLID WORKS /CATIA / NX etc.

Lab-IV : Simulation lab

1. Structural Analysis using any FEA Package for different structures that can be discretised with 1-D,2-D & 3-D elements
2. Static Analysis
3. Modal Analysis
4. Harmonic Analysis
5. Spectrum Analysis
6. Buckling Analysis
7. Analysis of Composites
8. Fracture mechanics

II. Thermal Analysis using any FEA Package for different structures that can be discretised with 1-D,2-D & 3-D elements
1. Steady state thermal analysis
2. Transient thermal analysis

III. Transient analysis using any FEA Package for different structures that can be discretised with 1-D,2-D & 3-D elements

IV. Prudent Design – a case study

Advanced Finite Element Method (18313T01)

Ting Scheme

Lectures: 3 hrs/week

Course Outcomes:

At the end of the course, the students will be able to
1. Demonstrate understanding of FE formulation for linear problems in solid mechanics
2. Understand behaviour of elastic-plastic materials and visco-plasticity, Use of Newton- Raphson method for solving nonlinear equations of equilibrium
3. Understand flow rules and strain hardening, loading and unloading conditions, Drucker's stability postulates, J2 flow of theory of plasticity
4. Demonstrate use of FE formulation to solve the problems of large deformation of structures under loads
5. Able to solve contact problems oby using the techniques of non-linear FEM.

Syllabus Contents

Unit 1. Review of linear FEA:

FE formulation of 1D bar, 3D linear elastic continuum, 2D plane strain, plane stress, and axisymmetric elements; Iso-parametric mapping; numerical integration.

Unit 2. FE formulation for 1D plasticity:

Elastic-perfectly plastic material; Isotropic and kinematic hardening; Integration algorithms for 1D plasticity; FE formulation; Newton-Raphson method for solving nonlinear equilibrium equations;1D visco-plasticity and integration algorithm.

Continuum theories of plasticity:

Review of tensor algebra; Yield condition, flow rule and hardening rules; loading and unloading conditions; Drucker's stability postulates; Convexity and normality; J2 flow theory of plasticity and visco-plasticity, Gurson model.

Unit 3. FE procedures for 2D and 3D plasticity:

Integration algorithms for rate independent plasticity—explicit forward Euler and implicit backward Euler; Return mapping algorithm; visco-plasticity.FE formulation; Consistent linearization; Algorithmic and consistent tangent modulii; Treatment of incompressible deformation (Locking); B-bar method.

Unit 4. FE procedures for large deformation problems:

Continuum mechanics—deformation gradient, polar decomposition, Green-Lagrange strain, rate of deformation, Cauchy stress, P-K stresses, Balance laws; Principle of objectivity and isotropy. Constitutive equations for hyperelasticity;Neo-Hookean model; FE formulation— Total Lagrangian and updated Lagrangian descriptions; Tangent Stiffness Matrix. Introduction to finite strain plasticity.

Unit 5. Contact Problems:

Condition of impenetrability; Gap elements for modelling contact.Tangent stiffness matrix and force vectors for 2D frictionless contact problems.

TEXT BOOKS:

1) K. J. Bathe, Finite Element Procedures, Prentice-Hall of India Private Limited, New Delhi,1996
2) J. C. Simo and T. J. R. Hughes, Computational Inelasticity, Springer-Verlag New York, Inc., New York, 1998

REFERENCES:

1) O. C. Zienkiewicz and R. L. Taylor, Finite Element Method: Volume 2 Solid Mechanics, Fifth Edition, Butterworth-Heinemann, Oxford, 00
2) T. Belytschko and W. K. Liu and B. Moran, Nonlinear Finite Elements for Continua and Structures, John Wiley & Sons Ltd., England, 00
3) D. R. J. Owen and E. Hinton, Finite Elements in Plasticity: Theory and Practice, Pineridge Press Ltd., 00

OPEN ELECTIVES
Business Analytics (18313T03)

Teaching scheme

Lecture: - 3 h/week
Course objective

1.Understand the role of business analytics within an organization.

2.Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.

3.To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.

4.To become familiar with processes needed to develop, report, and analyze business data.

5.Use decision-making tools/Operations research techniques.

6.Mange business process using analytical and management tools.

7.Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

Syllabus Contents:

Unit 1: Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics.Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

Unit 2: Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel,Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

Unit 3: Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes.Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

Unit 4: Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models.Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

Unit-5

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

COURSE OUTCOMES:

1. Students will demonstrate knowledge of data analytics.
2. Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
3. Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
4. Students will demonstrate the ability to translate data into clear, actionable insights.

TEXT BOOKS:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G.Schniederjans, Christopher M. Starkey, Pearson FT Press.

2. Business Analytics by James Evans, persons Education.

OPEN ELECTIVES

Operations Research (18313T05)

Teaching Scheme

Lectures:3hrs/week

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

1. Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.
2. Students should able to apply the concept of non-linear programming
3. Students should able to carry out sensitivity analysis
4. Student should able to model the real world problem and simulate it.

Unit 1:

Optimization Techniques, Model Formulation, models, General L.R Formulation.
Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit 2

Formulation of a LPP - Graphical solution revised simplex method.
Duality theory - dual simplex method - sensitivity analysis - parametric programming

Unit 3:

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem.
Max flow problem - CPM/PERT

Unit 4

Scheduling and sequencing - single server and multiple server models.
Deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Unit 5

Competitive Models,Single and Multi-channel Problems, Sequencing Models.
Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation.

TEXT BOOKS:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.

REFERENCE:

1. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
2. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
3. Pannerselvam, Operations Research: Prentice Hall of India 2010
4. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

Open Elective
Cost Management of Engineering Projects (18313T06)

Teaching scheme
Lecture: - 3 h/week

Introduction and Overview of the Strategic Cost Management Process

Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non- technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

TEXT BOOKS:

1.Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi.
2.Charles T. Horngren and George Foster, Advanced Management Accounting.

REFERENCES:

1. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting.
2.Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher.
3.N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

Dissertation (Phase-I) **(18313P08)**	
Ting Scheme Lectures: hr/week	

Course Outcomes:

At the end of the course:

1. Students will learn to survey the relevant literature such as books, national/international refereed journals and contact resource persons for the selected topic of research.
1. Students will be able to use different experimental techniques.
2. Students will be able to use different software/ computational/analytical tools.
3. Students will be able to design and develop an experimental set up/ equipment/test rig.
4. Students will be able to conduct tests on existing set ups/equipments and draw logical conclusions from the results after analyzing them.
5. Students will be able to either work in a research environment or in an industrial environment.

Syllabus Contents:

The Project Work will start in semester III and should preferably be a problem with research potential and should involve scientific research, design, generation/collection and analysis of data, determining solution and must preferably bring out the individual contribution. Seminar should be based on the area in which the candidate has undertaken the dissertation work as per the common instructions for all branches of M. Tech. The examination shall consist of the preparation of report consisting of a detailed problem statement and a literature review. The preliminary results (if available) of the problem may also be discussed in the report. The work has to be presented in front of the examiners panel set by Head and PG coordinator. The candidate has to be in regular contact with his guide and the topic of dissertation must be mutually decided by the guide and student.

Dissertation (Phase- II) (18314P01)	
Ting Scheme Practical Hours: 32 per week	
Course Outcomes: At the end of the course: 1. Students will develop attitude of lifelong learning and will develop interpersonal skills to deal with people working in diversified field will. 2. Students will learn to write technical reports and research papers to publish at national and international level. 3. Students will develop strong communication skills to defend their work in front of technically qualified audience.	

Syllabus Contents:

It is a continuation of Project work started in semester III. He has to submit the report in prescribed format and also present a seminar. The dissertation should be presented in standard format as provided by the department. The candidate has to prepare a detailed project report consisting of introduction of the problem, problem statement, literature review, objectives of the work, methodology (experimental set up or numerical details as the case may be) of solution and results and discussion. The report must bring out the conclusions of the work and future scope for the study. . The work has to be presented in front of the examiners panel consisting of an approved external examiner, an internal examiner and a guide, co-guide etc. as decided by the Head and PG coordinator. The candidate has to be in regular contact with his guide.

I YEAR –I & II SEMESTER

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AUDIT 1 and 2: ENGLISH FOR RESEARCH PAPER WRITING
(18311T10) & (18312T09)

Course objectives:

Students will be able to:

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title

Ensure the good quality of paper at very first-time submission

Syllabus		
Units	CONTENTS	Hours
1	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	4
4	key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,	4
5	skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions. useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	4

SUGGESTED STUDIES:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book .
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

18EC1T04: Problem Solving through C and Python Scheme and

Credits: L:3 T:0 P:0 C:3

Prerequisites: -

Course Outcomes
The student will learn

- To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To use structures and files

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.

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. Muti way decision making statements: else if, Switch statement **Looping 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.

INTRODUCTION TO PYTHON PROGRAMMING

Programming Using the REPL (Shell), Running Python Scripts, Variables, Assignment, Keywords, Input- Output, Indentation. Data Types, Operators, Expressions and order of evaluations, Control Flow- if, if- elseif-else

Text Books:

1. Reema Thareja, ‒Programming in C‖, Oxford University Press, Second Edition, 2016.
2. Krnighan. B.W and Ritche, D.M, ‒The C Programming Language‖, Second Edition, Pearson Education, 2006
3. Pradep dey, Manas Ghosh, ‒Fundamentals of Computing and programming in C‖, First Edition, Oxford University Press, 2009.
4. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

References:

1. Paul Deitel and Harvey Deitel, ―C How to Program‖, Seventh Edition, Pearson Publication.
2. E Balagursamy, ‒Programming in C, Sixth Edition, Tata McGraw Hill.
3. Ajay Mittal, ―Programming in _C' A practical Approach‖, Pearson education
4. Learning Python, Mark Lutz, Orielly

18EC1T05: ENGINEERING GRAPHICS

Scheme and Credits: L:3 T:0 P:0 C:3 Prerequisites: -

Course Outcomes:

CO1: Draw the polygons, ellipse, parabola, hyperbola, cycloids and involutes for various types of profiles. **CO2**: Construction of various scales like plain, diagonal and venier scales .Draw the orthographic projections of the points, lines.

CO3: Draw the projections of planes.

CO4: Draw the projections of solids

CO5: Convert Orthographic projections to isometric projection and vice versa.

Syllabus:

UNIT I:

Lettering, Dimensioning, Geometrical Constructions. Polygons: General construction method, Inscribing and describing methods.

Cycloids: Cycloid, Epicycloid, Hypocycloid and Involutes- Tangent and Normals to the above curves.

UNIT II:

Orthographic projections: Introduction, Projections of points.

Projections of straight lines- parallel to both the planes, parallel to one plane and inclined to the other plane. Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT III

Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane, Projections of planes inclined to both the reference planes.

UNIT IV: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the reference planes.

Sections of solids: Prisms, Pyramids, Cones and Cylinders in simple positions.

UNIT V: Isometric Projections: Isometric views/projections of planes and simple solids, Conversion of orthographic views to isometric views. Conversion of isometric views to orthographic views. Introduction to AutoCAD

Text Books:

1. Engineering Drawing, N. D. Butt, Chariot Publications
    2.   Engineering Drawing +Auto CAD, K Venugopal &V Prabhuraja, Newage Publishers.

2**Reference Books:**

1. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
2. Engineering Graphics for Degree, K. C. John, PHI Publishers
3. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
4. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

18EC1L08: Problem Solving Lab using C and Python

Scheme and Credits: L:0 T:0 P:4 C:2

Prerequisites: - Syllabus:

1. Write a C program to convert temperature from Fahrenheit to Celsius.

a. Write a C program to find the roots of a quadratic equation.

b. Write a program to implement simple calculator using switch case

2. Write a C program to determine if the given number is a prime number or not. Write a program to display the factorial of a given number

3. Write a program to display whether a given is Armstrong or not

Write a C program to generate the first n terms of the Fibonacci sequence.

4. Write a C program to display the reverse of a given number.

Write a C program to calculate the following sin and cos value

5. Write a program for sorting numbers in a list.

6. Write programs for searching a number in the list using

a. Linear search

b. Binary search

7. Write programs that reads two matrices to perform the following:

a. Addition of two matrices

b. Multiplication of two matrices

8. Write a program to perform the following operations without using build in string operations:

a. To display the length of the string.

b. To check whether the string is palindrome or not

c. To delete n characters from a given position in a given string.

9. Write a program to generate GCD of two numbers using functions

10. Write a C program that reads two integers n and r to compute the ncr value using the following relation: $n_{cr}(n, r) = n! / r! (n,r)!$. Use a function for computing the factorial value of an integer.

11. Write programs for the following using recursive functions

    a. Factorial of a given number

    b. GCD of two numbers

c. Fibonacci series

12. Write a program to demonstrate call by value and call by reference.

13. Write a program to perform following operating using pointers

    a. Reverse of a string

    b. Comparison of two strings

14. Write a program for displaying the details of the student by sorting them according to the marks using structure containing roll no, name and marks.

15.
    a. Running instructions in Interactive interpreter and a Python Script
    b. Write a program to purposefully raise Indentation Error and correct it

16..
    a. Write a python program to compute distance between two points taking input from the user(Pythagorean Theorem)
    b. Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

  17. Write a Program for checking whether the given number is an even number or not.

18EC2T04: Biology for Engineers

Course Outcomes

After studying the course, the student will be able to:

CO 1: Understand how biological observations lead to major discoveries and the morphological, Biochemical and ecological classification of organisms.

CO 2: Understand that all forms of life have the same building blocks and their involvement in the Maintenance and metabolic processes of living organisms.

CO 3: Classify enzymes and distinguish between different mechanisms of enzyme action and Study the chemical reactions that are catalyzed by enzymes. Apply thermodynamic principles to biological systems and able to understand major chemical processes that occur within a living organism in order to maintain life.

CO 4: Identify DNA as a genetic material in the molecular basis of information transfer.

CO 5: Identify and classify microorganisms, understand media compositions and growth of Microorganisms

Unit I: Introduction

Importance and need of biology- Discoveries of biology in 18th Century: Brownian motion and the origin of thermodynamics- their importance in any scientific inquiry. Classification of organisms based on (a) Cellularity- Unicellular or Multicellular, (b) Ultra structure- prokaryotes or eucaryotes. (c) Energy and carbon utilization -autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitat- acquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life.

Unit II: Biomolecules

Introduction to molecules of life-monomeric units and polymeric structures of carbohydrates, Sugars, starch and cellulose, amino acids and proteins structure and function. Nucleotides and DNA/RNA, Hierarchy of DNA Structure- from single stranded to double helix, two carbon units and lipids.

Unit III: Enzymes & Metabolism

Enzyme classification, mechanism of enzyme action, enzyme kinetics and kinetic parameters. Thermodynamics as applied to biological systems, endergonic and exergoinc reactions, Concept of kinetic equilibrium and its relation to standard free energy Spontaneity, ATP as an energy currency, Glycolysis, Krebs cycle and Energy yielding and energy consuming reactions.

Unit IV: Information Transfer

Concept of genetic code. Molecular basis of information transfer; Transcription and translation.

Unit V: Microbiology

Concept of species and strains, Identification of Microorganisms. Sterilization and media compositions, Growth kinetics.

Text/Reference Books:

1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons
3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company
4. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
5. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C.Brown Publishers

18EC2T05: Basic Electronics and Electrical

Engineering Scheme and Credits: L:3 T:1 P:0 C:4

Prerequisites:

- Course

Outcomes

- To understand and analyze basic Electrical circuits
- To study the working principles of Electrical Machines
- .to understand the concepts of power generation and transmission
- To introduce components of Electrical Installations
- To understand various electrical safety measures
- To understand the concepts and applications of electronic devices

SYLLABUS

Unit – I: Diodes

PN junction diode- Energy band diagram of PN junction Diode- V-I Characteristics -Current components in PN junction Diode- Diode equation- Diode resistance and capacitance- Characteristics of Zener Diode- Varactor Diode- SCR and UJT.

Unit-II: Rectifiers & Wave Shaping:

Half wave, Full wave Rectifier and Bridge rectifier- Derivations of characteristics of rectifiers- Filters- Inductive and Capacitive filters- Non Linear Wave shaping Circuits.

Unit-III: Transistor Characteristics:

Bipolar Junction Transistor- Transistor current components- Transistor equation- Transistor configurations- Characteristics of a transistor in CB,CC & CE configurations- Transistor as a Switch- Transistor as an amplifier.

Transistor Biasing and stabilization

Introduction- Different Biasing Methods- Fixed bias, Collector to Base bias & voltage divider bias- Stabilization against variations in V_{BE}, I_C & β- Stabilization factors- Bias compensation, Thermal Runaway- Thermal Stability.

Unit-IV: Field Effect Transistors (FET):

Junction Field Effect Transistor construction & operation- characteristics CS, CD & CG- FET Biasing methods and stabilization- **MOSFET:** Metal Oxide Semiconductor Field Effect Transistor- Types- Construction- Operation & characteristics

Unit V: Electrical Devices

Transformers – Operation, working Principle and types – Motors – AC, DC, Servo & Synchros – Operations & Working Principle – Applications of Electrical Devices

Text Books:

1. 1.Electronic Devices & Circuits –J.Millman, C.Halkias, Tata Mc-graw Hill,2nd Edition
2. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA McGraw Hill, 2nd Edition
3. D. P. Kothari and I. J. Nagrath, ‒Basic Electrical Engineering‖, Tata McGraw Hill, 2010.

Reference Books:

1. D. C. Kulshreshtha, ‒Basic Electrical Engineering‖, McGraw Hill, 2009.
2. Basic Electronic Circuits -V.K.Mehta,S-chand Publications,2008.
3. Electronic Devices & Circuits-David-A-Bell,oxford University Press 5th Edition.

18EC2L08: Basic Electronics & Electrical Engineering Lab

Scheme and Credits: L:0 T:0 P:4

C:2 Prerequisites: -

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

COURSE OBJECTIVES:

- To study basic electronic components
- To observe characteristics of electronic devices

COURSE OUTCOMES:

- At the end of the course the students can able to
- Measure voltage, frequency and phase of any waveform using CRO.
- Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.
- Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers, amplifiers etc.,

Electronic Workshop Practice:

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

List of Experiments: (All Experiments has to be performed)

1. CRO Operation and its Measurements
2. **Characteristics of Semiconductor Diode and Zener Diode:** Determination of forward and reverse resistance from VI characteristics.

3. **Static Characteristics of BJT under CE Mode:** Transistor Biasing **Determination** of h-parameters hie, hre from input characteristics and hfe & hoe from output characteristics.

4. **Static Characteristics of JFET:** Determination of rd from drain characteristics and gm from mutual characteristics and hence obtain μ.

5. **Characteristics of UJT and SCR:** Determination of intrinsic standoff ratio from emitter characteristics.

6. **Resonant Circuits:** Characteristics of Series and Parallel Circuits, Determination of quality factor and bandwidth.

7. **Bridge Rectifier with and without C-Filter:** Display of output waveforms and Determination of ripple factor, efficiency and regulation for different values of load current.

8. **Diode Clipping Circuits:** Design and display the transfer characteristics of single ended series, shunt type and double ended shunt type clipping circuits.

9. **Study of Electrical Devices**

10. **Experiment on working principle of Transformers**

11. **Experiment on working Principle of Motors**

	L	**T**	**P**	**C**
III Year - I Semester	**4**	**0**	**0**	**3**

COMPUTER ARCHITECTURE AND ORGANIZATION

OBJECTIVES:

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

UNIT -I:
Basic Structure Of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

UNIT -II:
Machine Instruction and Programs:
Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types,
Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

UNIT -III:
Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes,
Input/output Operations

UNIT -IV:
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)

UNIT -V:
The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory,
Cache Memories: Mapping Functions, INTERLEAVING
Secondary Storage: Magnetic Hard Disks, Optical Disks,

UNIT -VI:
Processing Unit: Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory,
Execution of Complete Instruction, Hardwired Control,
Micro programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

OUTCOMES:
- Students can understand the architecture of modern computer.
- They can analyze the Performance of a computer using performance equation
- Understanding of different instruction types.
- 4. Students can calculate the effective address of an operand by addressing modes
- 5. They can understand how computer stores positive and negative numbers.
- 6. Understanding of how a computer performs arithmetic operation of positive and negative numbers.

TEXT BOOKS:

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.

2. Computer Architecture and Organization , John P. Hayes ,3rd Edition, McGraw Hill.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson

3. Fundamentals or Computer Organization and Design, - Sivaraama Dandamudi Springer Int. Edition.

4. "Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy.

5. J .P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.

	L	**T**	**P**	**C**
III Year - I Semester	**0**	**3**	**0**	**0**

PROFESSIONAL ETHICSAND HUMAN VALUES

Course Objectives:

*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

UNIT I: Human Values:
Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT: II: Principles for Harmony:
Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT III: Engineering Ethics and Social Experimentation:
History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism — Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument –Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV: Engineers' Responsibilities towards Safety and Risk:
Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V: Engineers' Duties and Rights:
Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights –Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes- Industrial Espionage- Price Fixing-Whistle Blowing.

UNIT VI: Global Issues:
Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

- Related Cases Shall be dealt where ever necessary.

Outcome:
*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

References:

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi.
2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger - Tata McGraw-Hill – 2003.
3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana - Maruthi Publications.
4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.
7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran – University Science Press.
8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013
9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

	L	T	P	C
III Year - II Semester

L	T	P	C
4	0	0	3

OOPS THROUGH JAVA
OPEN ELECTIVE

OBJECTIVES:
- Understanding the OOP's concepts, classes and objects, threads, files, applets, swings and act.
- This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
- Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development

UNIT-I:
Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure.
Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

UNIT-II:
Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

UNIT-III:
Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class.
Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package. Exception handling, importance of try, catch, throw, throws and finally block, user-defined exceptions, Assertions.

UNIT-IV:
Multithreading: introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file,

UNIT-V:
Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

UNIT-VI:
AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

OUTCOMES:
- Understand Java programming concepts and utilize Java Graphical User Interface in
   Program writing.
- Write, compile, execute and troubleshoot Java programming for networking concepts.
- Build Java Application for distributed environment.
- Design and Develop multi-tier applications.

- Identify and Analyze Enterprise applications.

TEXT BOOKS:

1. The complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Programming in JAVA, Sachin Malhotra, Saurabh Choudary, Oxford.
3. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

REFERENCE BOOKS:

1. Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in
2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

DATA MINING
OPEN ELECTIVE

OBJECTIVES:

- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

UNIT –I
Introduction: Why Data Mining? What Is Data Mining?1.3 What Kinds of Data Can Be Mined?1.4 What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity

UNIT –II
Data Pre-processing: Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

UNIT –III
Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

UNIT –IV
Classification: Alterative Techniques, Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

UNIT –V
Association Analysis: Basic Concepts and Algorithms: Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. **(Tan & Vipin)**

UNIT –VI
Cluster Analysis: Basic Concepts and Algorithms: Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. **(Tan & Vipin)**

OUTCOMES:
- Understand stages in building a Data Warehouse
- Understand the need and importance of preprocessing techniques
- Understand the need and importance of Similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for Association Rules.
- Analyze Classification and Clustering algorithms

TEXT BOOKS:

1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

REFERENCE BOOKS:

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining : Vikram Pudi and P. Radha Krishna, Oxford.
3. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.

INDUSTRIAL ROBOTICS
OPEN ELECTIVE

Course Objectives:

1. To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.
2. The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning.
3. Mathematical approach to explain how the robotic arm motion can be described.
4. The students will understand the functioning of sensors and actuators.

UNIT-I
INTRODUCTION: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

UNIT – II
COMPONENTS OF THE INDUSTRIAL ROBOTICS: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT – III
MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems.
MANIPULATOR KINEMATICS: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – IV
Differential transformation and manipulators, Jacobians – problems
Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

UNIT V
General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language..

UNIT VI
ROBOT ACTUATORS AND FEED BACK COMPONENTS:
Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.
 Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.
ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

TEXT BOOKS:

1.   Industrial Robotics / Groover M P /Pearson Edu.
2.   Robotics and Control / Mittal R K & Nagrath I J / TMH.

REFERENCES:

1.   Robotics / Fu K S/ McGraw Hill.
2.   Robotic Engineering / Richard D. Klafter, Prentice Hall
3.   Robot Analysis and Control / H. Asada and J.J.E. Slotine / BSP Books Pvt.Ltd.
4.   Introduction to Robotics / John J Craig / Pearson Edu.

Course outcomes:

Upon successful completion of this course you should be able to:

1.   Identify various robot configuration and components,
2.   Select appropriate actuators and sensors for a robot based on specific application
3.   Carry out kinematic and dynamic analysis for simple serial kinematic chains
4.   Perform trajectory planning for a manipulator by avoiding obstacles.

POWER ELECTRONICS
(Open Elective)

Preamble:
The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semiconductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

Learning Objectives:
- To study the characteristics of various power semiconductor devices and to design firing circuits for SCR.
- To understand the operation of single phase half wave and full–wave converters
- To understand the operation of different types of DC-DC converters.
- To understand the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- To understand the operation of AC-AC converters and switch mode power supplies operation.

UNIT–I
Power Semi-Conductor Devices
Thyristors–Silicon controlled rectifiers (SCR's) – Characteristics of power MOSFET and power IGBT – Basic theory of operation of SCR–Static characteristics – Turn on and turn off methods–Dynamic characteristics of SCR – Snubber circuit design – Firing circuits for SCR

UNIT–II
AC-DC Single-Phase Converters
Single phase half wave controlled rectifiers – R load and RL load with and without freewheeling diode – Single Phase full wave controlled rectifiers – center tapped configuration and bridge configuration – R load and RL load with and without freewheeling diode – Effect of source inductance in 1-phase fully controlled bridge rectifier.

UNIT–III
DC–DC Converters
Buck Converter operation – Time ratio control and current limit control strategies–Voltage and current waveforms–Derivation of output voltage –Boost converter operation –Voltage and current waveforms–Derivation of output voltage – Buck-Boost converter operation –Voltage and current waveforms – Principle operation of forward and fly back converters

UNIT – IV
DC–AC Converters
Single phase inverters–Unipolar and bipolar switching – Single phase half bridge and full bridge inverters with R and RL loads – PWM techniques– Sine triangular PWM technique– amplitude and frequency modulation Indices – Harmonic analysis.

UNIT – V
AC – AC Single-Phase Converters
Static V-I characteristics of TRIAC and modes of operation – Single phase AC-AC regulator phase angle control and integrated cycle control with R and RL load – For continuous and discontinuous conduction – Principle of operation of Cyclo-Converters

UNIT – VI
Switch Mode Power Supplies
Overview of Switching Power Supplies – Linear Power Supplies – DC to DC converters with electrical isolation – Control of Switch Mode DC Supplies – PWM duty ratio control – Current mode control – Power Supply Protection

Learning Outcomes:
Student should be able to
- Explain the characteristics of various power semiconductor devices and analyse the static and dynamic characteristics of SCR's.
- Design firing circuits for SCR.
- Able to explain the operation of single phase half wave and full–wave converters
- Analyse the operation of different types of DC-DC converters.
- Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- Analyse the operation of AC-AC converters.
- Able to explain switch mode power supplies operation and control

Text Books:
1. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India, 2009

Reference Books:
1. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
2. Elements of Power Electronics–Philip T.Krein.oxford.
3. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
4. Power Electronics handbook by Muhammad H.Rashid, Elsevier.
5. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group.

ARTIFICIAL NEURAL NETWORKS

OPEN ELECTIVE

Course Objectives:

1. To Introduce the concept of Artificial Neural Networks , Characteristics, Models of Neuron, Learning Rules, Learning Methods, Stability and Convergence

2. To study the basics of Pattern Recognition and Feed forward Neural Networks

3. To study the basics of Feedback neural networks and Boltzmann machine

4. To introduce the Analysis of Feedback layer for different output functions, Pattern Clustering and Mapping networks

5. To study the Stability, Plasticity, Neocognitron and Different applications of Neural Networks

UNIT-I : Basics of Artificial Neural Networks
Introduction: Biological Neural Networks, Characteristics of Neural Networks, Models of Neuron, Topology, Basic Learning Rules
Activation and Synaptic Dynamics: Activation Dynamic Models, Synaptic Dynamic Models, Learning Methods, Stability & Convergence, Recall in Neural Networks

UNIT-II: Functional Units of ANN for Pattern Recognition Tasks: Pattern Recognition problem Basic Fundamental Units, Pattern Recognition Tasks by the Functional Units
Feed forward Neural Networks: Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks

UNIT-III:
Feedback Neural Networks: Analysis of linear auto adaptive feed forward networks, Analysis of pattern storage Networks, Stochastic Networks & Stimulated Annealing, Boltzmann machine

UNIT-IV:
Competitive Learning Neural Networks**:** Components of a Competitive Learning Network, Analysis of Feedback layer for Different Output Functions, Analysis of Pattern Clustering Networks and Analysis of Feature Mapping Network

UNIT-V:
Architectures for Complex Pattern Recognition Tasks**:** Associative memory, Pattern mapping Stability – Plasticity dilemma: ART, temporal patterns, Pattern visibility: Neocognitron

UNIT-VI:
Applications of Neural Networks: Pattern classification, Associative memories, Optimization, Applications in Image Processing, Applications in decision making

Text Book

1. B.Yagnanarayana"Artificial Neural Networks", PHI

Reference Book

1. Laurene Fausett ,"Fundamentals of Neural Networks", Pearson Education

2. Simon Haykin , "Neural Networks", Second Edition

Course Outcomes

1. This Course introduces Artificial Neural Networks and Learning Rules and Learning methods

2. Feed forward and Feedback Neural Networks are introduced

3. Applications of Neural Networks in different areas are introduced

ENGLISH-1

I Year – I Semester

Lecture: 2 Practical: 0   Internal Marks: 30

Credits: 2 Tutorial: 0   External Marks: 70

Prerequisites: -

Course Outcomes

CO 1: Use English language, both written and spoken, competently and   correctly.

CO 2: Improve comprehension and fluency of speech.

CO 3: Gain confidence in using English in verbal situations.

CO 4: Hone the communication skills to meet the challenges of their careers very

successfully.

CO 5: Strengthen communication skills in different contexts like formal and informal.

CO 6: Develop knowledge of different fields and serve the society accordingly

Syllabus:

Unit 1	Human Resources : Ideal Family
Unit 2	In London:Verger
Unit 3	Our Living Environment: Three Days to See
Unit 4	Energy: Alternative Sources: War
Unit 5	Principles of Good Writing : Letter Writing

References:
1. English for Engineers and Technologists, Orient Blackswan
2. Prose for Communication, Ravindra Publishing House
3. Panorama, Oxford University Press

LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS

I Year – I Semester

Lecture: 3	Practical: 0	Internal Marks: 30
Credits: 4	Tutorial: 1	External Marks: 70

Prerequisites: -

Course Outcomes:

1. Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations

2. Illustrate the methods of computing eigen values and eigen vectors

3. Able to analyze the real life situations, formulate the differential equations then apply the solving methods

4. Explain the techniques of solving the linear differential equations

5. Optimize functions of several variables and able to find extreme values of constrained functions

Syllabus:

UNIT I: Linear systems of equations, Eigen values & Eigen vectors

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence, Consistency of linear system of equations, System of linear homogeneous equations.Gauss -Jordan method, LU decomposition method,

Application: Finding the current inelectrical circuits, Eigen values, Eigen vectors, Properties of Eigen values(without proofs).

UNIT II: Quadratic forms & Differential calculus:

Cayley-Hamilton theorem(without proof), Reduction to diagonal form, Reduction of quadratic form to canonical form, Nature of quadratic form. Limits and continuity and differentiability, Mean value theorems, Taylor's and Maclaurin's series.Functions of two variables, Partial derivatives, Homogeneous functions, Total derivative, Jacobian, Taylor's theorem for functions of two variables.

Applications: Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT III: Differential equations of first order:

Formation of a differential equation, Solution of a differential equation, Variables separable method, 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.

UNIT IV: Differential equations higher order:

Definitions, Complete solution, Operator D, Rules to find Complementary function, Inverse operator, Rules to find the particular integral(RHS term of the type e^{ax} , Sin(ax+b), cos(ax+b), polynomials in x).Rules to find the particular integral(RHS term of the type e^{ax} V(x), any other function), Method of variation of parameters. **Application:** L-C-R circuits.

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

Text Books:

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

Reference Books:

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

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

APPLIED PHYSICS
I Year – I Semester

Lecture: 3   Practical: 0   Internal Marks: 30

Credits: 3   Tutorial: 0   External Marks: 70

Prerequisites: -

Course Outcomes

1: Study of lasers and optical fibers with an emphasis of their application in communication in particular.

2: Outline the principles of Quantum mechanics to understand the principles of solid state materials for use in

engineering applications.

3: The Analytical study of response of materials to Electromagnetic fields.

4: To study various magnetic and dielectric materials and their Engineering applications.

5: To Gain knowledge on the physics of semiconductors for their engineering applications.

SYLLABUS
UNIT –I
LASERS
Characteristics of Lasers – Spontaneous and Stimulated Emission – Population Inversion - Einstein

Coefficients – Ruby Laser – He-Ne Laser – Recording and Reconstruction of Holography-

Applications.

OPTICAL FIBERS

Principle of Optical fiber – construction – Acceptance angle – Numerical Aperture – Types of Optical fibers – Single and Multi mode, Step Index and Graded Index fibers — Advantages of Optical Fibers in Communication – Applications in Communication.

UNIT – II
QUANTUM THEORY OF SOLIDS
Matter waves – Physical significance of wave function – Schrodinger's Time independent wave

equation.Schrodinger's Time dependent wave equation - Particle in a 1 Dimensional Potential well.

UNIT-III
ELECTROMAGNETIC FIELDS
Grad – Div – Curl – Gauss and Stoke's theorems – Fundamental Laws of Electromagnetism.

Maxwell's Equations – Poynting vector – Propagation of Electromagnetic waves in a dielectric

medium.

UNIT-IV
MAGNETIC MATERIALS

Origin of magnetic moment – Classification of magnetic materials (Dia, Para, Ferro) - Weiss theory of Ferromagnetic domains – Hysteresis – Soft and Hard magnetic materials - Applications.

DIELECTRIC MATERIALS

Types of Polarization – Dielectrics in DC and AC fields – Internal field –ClausiusMossoti Equation – Dielectric Loss and Dielectric Breakdown – Ferroelectric Hysteresis and applications.

UNIT-V
PHYSICS OF SEMICONDUCTORS

Carrier Concentration in Intrinsic semiconductor – Fermi level and electrical conductivity in intrinsic semiconductors - Carrier Concentration in Extrinsic semiconductors – Variation of Fermi level with temperature and impurity concentration.Drift and Diffusion currents – Einstein's relation – Hall Effect & its applications.

Text Books:
1. Engineering Physics by R.K.Gaur and S.L.Gupta – Dhanpatrai Publications
2. Engineering Physics by M.Avadhanuluand P.G. Kshirasagar – S Chand Publications (10th Edition)
3. Applied Physics by S.O.Pillai – New Age Publications – (3rd Edition)

Reference Books:
1. Engineering Physics by P.K.Palanisamy – Scitech Publications (2014 Edition)
2. Engineering Physics by M.Armugam – Anuradha Publications
3. Engineering Physics by M.R.Srinivasan (2014 Edition) New Age International Publications

Problem Solving Approaches

I Year – I Semester

Lecture: 3   Practical: 0   Internal Marks: 30

Credits: 3   Tutorial: 0   External Marks: 70

Prerequisites: -
Course Outcomes
      The student will learn
1. To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language.
2. To implement conditional branching, iteration and recursion.
3. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
4. To use arrays, pointers and structures to formulate algorithms and programs.
5. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
6. To use structures and files

SYLLABUS

UNIT – I:

Introduction to Computer Problem Solving: Programs and Algorithms, characteristics of an algorithm, Flowchart,Pseudo-code, TheProblem – Solving Aspect, Top-Down design

Fundamental Algorithms Introduction,Summation of a set of numbers, Factorial computation, Generation of Fibonacci sequence, reversing the digits of an Integer.

UNIT – II:

Factoring Methods: Introduction,GCD of two Integers, Generating Prime numbers, Computing the Prime Factors of an Integer, Generation of pseudo-random numbers

Array Techniques: Introduction, Array Order Reversal, Finding the Maximum number in a set, Removal of duplicates from an ordered array, Partitioning an Array

UNIT-III:

Programming Languages and Introduction to C Programming: Properties of Machine Language, Assembly Language, High-Level Languages, Procedural and Object-Oriented Languages.Structure of C program, Indentation, Comments,Identifiers& variables, DataTypes

Interactive Input, Formatted Output, FormatModifiers, Operators, Operator precedence & Associativity, Relational expressions, Type Casting,Mathematical Library Functions, Selection control statements: if and switch

UNIT -IV:

Repetition structures: Basic Loop Structures: while, for , do-while, Nested loops, **Modular Programming:** Functions and parameter declarations, Returning a Value,Functions with Empty Parameter Lists,Variable Scope

Modular Programming Variable Storage Class: Local, Global,**Pointers:** declaration and its usage, Functions with parameters: pass by value, pass by address, pointer to a function and function pointer

UNIT-V:

Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays- Matrices

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions related to strings.

TEXT BOOKS:

[1]   R.G. Dromey, "How to Solve it By Computer", Prentice-Hall International Series in Computer Science,1982.

[2]   ReemaThareja, "Computer Fundamentals and C Programming", Oxford, 2012

REFERENCE BOOKS:

[1]   DENNIS M. RITCHIE, BRIAN W KERNIGHAN, " The C Programming Language", Prentice-Hall International Series in Computer Science, Second Edition.
[2]   Michael Schneider, Steven W. Weingart, David M. Perlman, "An Introduction toProgrammingandProblemSolvingWithPascal",JohnWileyandSonsInc ,1984.

[3] David Gries, "The Science of Programming", Springer Verlag,1981.

ENGINEERING GRAPHICS

I Year – I Semester

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

Prerequisites: -

Course Outcomes:

1: Draw the polygons, ellipse, parabola, hyperbola, cycloids and involutes for various types of profiles.

2: Construction of various scales like plain, diagonal and venier scales .Draw the orthographic projections of the points, lines.

3: Draw the projections of planes.

4: Draw the projections of solids

5: Convert Orthographic projections to isometric projection and vice versa.

SYLLABUS:

UNIT I:

Lettering,Dimensioning, Geometrical Constructions. Polygons: General construction method, Inscribing and describing methods. Cycloids: Cycloid, Epicycloid, Hypocycloid and Involutes-Tangent and Normals to the above curves.

UNIT II :

Orthographic projections: Introduction, Projections of points.

Projections of straight lines- parallel to both the planes, parallel to one plane and inclined to the other plane.

 Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT III

Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane, Projections of planes inclined to both the reference planes.

UNIT IV: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the reference planes.

Sections of solids: Prisms, Pyramids, Cones and Cylinders in simple positions.

UNIT V:Isometric Projections: Isometric views/projections of planes and simple solids, Conversion of orthographic views to isometric views. Conversion of isometric views to orthographic views. Introduction to AutoCAD

Text Books:

1. Engineering Drawing, N. D. Butt, Chariot Publications
2. Engineering Drawing +Auto CAD, K Venugopal&V Prabhuraja, Newage Publishers.

Reference Books:

1. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
2. Engineering Graphics for Degree, K. C. John, PHI Publishers
3. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
4. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

ENGLISH COMMUNICATION SKILLS LAB-1

I Year – I Semester

Lecture: 0   Practical: 2   Internal Marks: 40

Credits: 1   Tutorial: 0   External Marks: 60

Prerequisites: -

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

List of Experiments:

1   Greetings and Introduction

2   Request 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

APPLIED PHYSICS LAB

I Year – I Semester

Lecture: 0   Practical: 3   Internal Marks: 40

Credits: 1.5   Tutorial: 0   External Marks: 60

Prerequisites: -

(Any 10 of the following listed experiments)

LIST OF EXPERIMENTS:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
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 Rigidity modulus of a material- Torsional Pendulum.
7. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
8. Verification of laws of vibrations in stretched strings - Sonometer
9. Determination of Young's modulus by method of single cantilever oscillations.
10. Melde's experiment – Transverse and Longitudinal modes.
11. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
12. L- C- R Series Resonance Circuit.
13. Study of I/V Characteristics of Semiconductor diode.
14. I/V characteristics of Zener diode.
15. Energy Band gap of a Semiconductor p - n junction.

Problem Solving Approaches Lab

I Year – I Semester

Lecture: 2	Practical: 3	Internal Marks: 40
Credits: 1.5	Tutorial: 0	External Marks: 60

Prerequisites: -

List of Experiments:

1. a. Write an algorithm, flowchart and pseudo code to perform all arithmeticoperations
   b. Write an algorithm, flowchart and pseudo code to find average of threenumbers
   c. Write an algorithm, flowchart and pseudo code to find smallest of threenumbers
2. a. Write an algorithm, flowchart and pseudo code for finding smallest divisor ofan integer.
   b. Write an algorithm, flowchart and pseudo code to find x^y
3. Write a C program to convert temperature from Fahrenheit to Celsius and viceversa.
4. Write a C program to find the roots of quadraticequation
5. Write a C program to find whether a given number isprime
6. Write a C program find whether a given number isarmstrong
7. Write a C program to display reverse of a givennumber
8. Write a C program to generate first n- terms of a fibonaccisequence.
9. Write a C program to calculate sin(x) value, where x is input given byuser
10. Write a C program to calculate cos(x) value, where x is input given byuser
11. Write a C program to perform operations on one dimensionalarray
    a. Smallest element of anarray
    b. Largest element of an array
    c. swap smallest and largest element in anarray
12. Write a C program to implement thefollowing
    a. Addition of twomatrices
    b. Multiplication of twomatrices
13. Write a C program to perform the following operations on strings without using string handlingfunctions
    a. To display length of thestring
    b. To check whether a string ispalindrome
    c. To delete n characters from a given position in a givenstring
14. Write recursive and non recursive programs for thefollowing
    a. Factorial of anumber
    b. GCD of twonumbers
    c. Fibonacciseries
15. Write a program which illustrates Storageclasses

IT WORKSHOP

I Year – I Semester

Lecture: 2	Practical: 2	Internal Marks: 40
Credits: 1	Tutorial: 0	External Marks: 60

Prerequisites: -

LIST OF EXPERIMENTS:

1. **System Assembling, Disassembling and identification of Parts / Peripherals**

2. **Operating System Installation**-Install Operating Systems like Windows, Linux .

3**. MS-Office**

  a. **Word** - Formatting, Page Borders, Reviewing, Equations, symbols.

  b. **Spread Sheet** - organize data, usage of formula, graphs, charts.

  c. **Power point** - features of power point, guidelines for preparing an effective

presentation.

  d. **Access**- creation of database, validate data.

4. **Network Configuration & Software Installation**-Configuring TCP/IP, proxy and firewall

settings. Installing application software, system software & tools.

5. **Internet and World Wide Web**-Search Engines, Types of search engines, netiquette, cyber

hygiene.

6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

7. **MATLAB-** basic commands, subroutines, graph plotting.

8. **LATEX**-basic formatting, handling equations and images.

Text Books:

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition by Gary B. Shelly, Misty E. Vermaat and Thomas J.
3. LATEX- User's Guide and Reference manual, Leslie Lamport, Pearson, LPE, 2/e.
4. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Rudraprathap, Oxford University Press, 2002.
5. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
6. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.
7. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
8. Introduction to Information Technology, ITL Education Solutions limited, Pearson
  Education.

I YEAR

SEMESTER-II

SYLLABUS

ENGLISH II

I Year – II Semester

Lecture: 1	Practical: 2	Internal Marks: 30
Credits: 2	Tutorial: 0	External Marks: 70

Prerequisites: -

SYLLABUS:

Unit 1   Transport: Problems and Solutions

        The Scarecrow

Unit 2   The Drunkard

A Village Lost to the Nation

Unit 3   Evaluating Technology

        The Knowledge Society

Unit 4   Industry: Safety and Training

        Martin Luther King and Africa

Unit 5   Man's Peril (Detailed)

        Report Writing

References:

1. English for Engineers and Technologists, Orient Blackswan

2. Prose for Communication, Ravindra Publishing House

3. Panorama, Oxford University Press

ENGLISH COMMUNICATION SKILLS LAB II

1	a.	Introducing Yourself and Other People
		Employability Skills
	b.	Introduction to Soft Skills
		My Skills, My Strengths
2	a.	Discussing Daily Routines
		Free Time Activities
	b.	Describing Family
		Talking about Family
3	a.	Giving Directions
		Ordering Food
	b.	Asking for and Paying the Bill
		Describing Appearances and Personality
4	a.	Writing a Product Description-1
	b.	Writing a Product Description-2
5	a.	Describing an Advertised Job
		Skills Needed for Different Jobs
	b.	What Kind of Job Are You Interested in?
		Finding out about a Job
6.	a.	Managing Nerves in a Presentation
	b.	Learning about Presentations

Reference:

Online Resources:

> **https://goo.gl/v57WHe**
> **http://www.careerbuilder.co.in**
> **https://goo.gl/w3FweC**
> **https://goo.gl/4GoueJ** **etc.**

VECTOR CALCULUS & FOURIER TRANSFORMS

I Year – II Semester

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

Prerequisites: -

SYLLABUS:

UNIT I: Special functions &Multiple integrals:

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

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

UNIT II: Vector Calculus:

Vector Differentiation: Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, Del applied to vector point functions-Div& Curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

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

UNIT III: Fourier Series:

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

UNIT IV: Fourier Transforms:

Fourier Integral, Fourier cosine & sine integral, complex forms of Fourier integral.

Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms(without proof), Convolution theorem(without proof), finite Fourier sine & cosine transforms.

UNIT V: Applications of Partial Differential Equations:

Definition of PDE, Classification of 2nd order PDE, Variable separable method, Vibrations of a stretched string – Wave equation.One-dimensional heat flow, Two-dimensional heat flow, Solution of Laplace's equation.

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, 1st Edition, 2007.

Reference Books:

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

APPLIED CHEMISTRY

I Year – II Semester

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

Prerequisites: -

COURSE OUTCOMES:

1: Study of polymers and composite materials enable us to use them in a good number of engineering fields

2: Industries are run by the quality of fuels and energy crisis can be met by broad understanding of different fuels

3: Electrochemical principles form the basis of batteries that are being developed. Destruction of metals and alloys can be prevented by understanding the science of corrosion.

4: Study of the existing developed materials forms a basis for developing more number of advanced materials

5: Methods of purification of water can be known so that more of them can be developed

6: The importance of engineering materials in the domestic and engineering fields can be understood.

SYLLABUS:

UNIT I: POLYMERS AND PLASTICS

Introduction- Degree of polymerization-functionality-tacticity-Types- Addition polymerization-Definition-PVC-Properties-applications condensation polymerization-Bakelite-Properties-applications,Physical and mechanical properties – Conducting polymers– Biodegradable polymers-applications– Natural rubber- Disadvantages - Compounding of rubber - vulcanization – Synthetic rubber: Thiokol -Thermoplastics and Thermosetting plastics –- Composite materials & Fiber reinforced plastics

UNIT II: BASICS OF ELECTRO CHEMISTRY AND CORROSION

 Galvanic cell - Electro chemical series - Standard electrodes (Hydrogen and Calomel electrodes)

Primary cells: Zinc – air cellSecondary cells:- Lithium ion batteries, Pb-acid cell,

Fuel cells:- H_2-O_2 fuel cell and molten carbonate fuel cells

*Corrosion:*Dry Corrosion– Wet (Electrochemical) Corrosion –Factors influencing the rate of corrosion – Protection from corrosion – Cathodic protection – Electro plating -Electroless plating

UNIT III: NON CONVENTIONAL ENERGY SOURCES

Solar Energy:- Introduction, application of solar energy, conversion of solar energy

(Thermal conversion & photo conversion) – photovoltaic cell: design, working and its importance

Non-conventional energy sources:

(i) Hydropower include setup a hydropower plant (schematic diagram)

(ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant

(iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.

(iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.

(v) Biomass and biofuels

UNIT IV: SEMICONDUCTORS AND SUPER CONDUCTORS

Non –Elemental Semi conductors: Stoichiometric, Non- Stoichiometric ,Controlled valency&Chalcogen photo/semiconductors- Preparation of Semiconductors Ge & Si by crystal pulling technique – purification by Zone refining.

Semiconductor Devices:- Diode –Transistor.

Super conductors:-Definition-Types- Characteristics –applications

UNIT V: ADVANCED MATERIALS AND GREEN CHEMISTRY

Nano materials:-Introduction –General methods of preparation (top down and bottom up)

Liquid Crystals-Definition, classification,applications

*Green synthesis:-*Introduction- Principles - methods of synthesis– alternative reactive media (aqueous phase method) and alternative energy sources(microwave method) -R4M4 principles-Econoburette.

SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

UV Spectroscopy- Basic principle-Instrumentation- ApplicationsIR Spectroscopy- Basic principle-Instrumentation- ApplicationsNMR Spectroscopy- Basic principle-Instrumentation- Applications

Analytical techniques: FE-SEM,TEM,BETChromatography techniques: Paper chromatography, Thin layer chromatography- applications

Text Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.

2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

Reference Books:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).

2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.

3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition

4. Applied Chemistry by H.D. Gesser, Springer Publishers

5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

Biology for Engineers

I Year – II Semester

Lecture: 2   Practical: 0   Internal Marks: 30

Credits: 2   Tutorial: 0   External Marks: 70

Prerequisites: -

COURSE OUTCOMES:

After studying the course, the student will be able to:

1: Understand how biological observations lead to major discoveries and the morphological,Biochemical and ecological classification of organisms.

2:Understand that all forms of life have the same building blocks and their involvement in the Maintenance and metabolic processes of living organisms.

3:Classify enzymes and distinguish between different mechanisms of enzyme action andStudy the chemical reactions that are catalyzed by enzymes. Apply thermodynamic, Principles to biological systems and able to understand major chemical processes that occur, Within a living organism in order to maintain life.

4: Identify DNA as a genetic material in the molecular basis of information transfer.

5: Identify and classify microorganisms, understand media compositions and growth of Microorganisms

SYLLABUS:

Unit-1: Introduction

Importance and need of biology- Discoveries of biology in 18th Century: Brownian motion and the origin of thermodynamics- their importance in any scientific inquiry.

Classification of organisms based on (a) Cellularity- Unicellular or Multicellular , (b) Ultra structure- prokaryotes or eucaryotes. (c) Energy and carbon utilization -autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitat- acquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life.

Unit-2: Biomolecules

Introduction to molecules of life-monomeric units and polymeric structures of carbohydrates, Sugars, starch and cellulose, amino acids and proteins structure and function.

Nucleotides and DNA/RNA, Hierarchy of DNA Structure- from single stranded to double helix, two carbon units and lipids.

Unit-3: Enzymes & Metabolism

Enzyme classification, mechanism of enzyme action, enzyme kinetics and kinetic parameters.\
Thermodynamics as applied to biological systems, endergonic and exergoinc reactions, Concept of kinetic equilibrium and its relation to standard free energy Spontaneity, ATP as an energy currency, Glycolysis, Krebs cycle and Energy yielding and energy consuming reactions.

Unit-4: Information Transfer

Concept of genetic code, Molecular basis of information transfer; Transcription and translation.

Unit-5: Microbiology

Concept of species and strains, Identification of Micro organisms.
Sterilization and media compositions, Growth kinetics.

Text/Reference Books:

1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M,

   L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd

2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley
and Sons

3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and
Company

4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company,
Distributed by Satish Kumar Jain for CBS Publisher

5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C.

   Brown Publishers

Basic Electrical & Electronics Engineering

I Year – II Semester

Lecture: 3   Practical: 0   Internal Marks: 30

Credits: 3   Tutorial: 0   External Marks: 70

Prerequisites: -

SYLLABUS:

Unit – I: Electric Circuits

Basic definitions, Types of network elements & sources, Ohms law, Kirchhoff's laws, Series & parallel circuits.Source transformation, Network reduction reductions, Introduction to AC circuits.

Unit – II: Electrical Machines

Basic laws – Faraday's laws of electromagnetic induction, Lenz's law, Right hand thumb rule, Fleming's left hand and right hand rules,Construction, working principle and applications of DC machinesConstruction, working principle and applications of transformers, induction motor and synchronous machines.

Unit – III: Electrical Power Generation, Transmission and Distribution

Sources of Energy – conventional & non conventional, Introduction and layout of thermal, hydel power plants, Introduction and layout of nuclear power plants, solar power plants, Concepts of power transmission and distribution using single line diagram.

Unit – IV: Electrical Installations & Safety

Components of Switchgear – fuse, MCBs, types of wires & cables, earthing, different types of batteries, Elementary calculations for energy consumption and types of tariffs. Energy Conservation.Electric shock and first aid, Hazardous areas, General principles of electric safety.

Unit – V: Basic Electronic Devices and their applications

Introduction to semi-conductor physics, PN junction diode, Zener diode, Transistor - operation, characteristics and configurations, Operation of transistor as a switch. Half wave, full wave and bridge rectifier using diodes, types of filters, Zener diode as a voltage regulator, transistor as an amplifier. introduction to feed back amplifiers.

Text Books:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.

2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

3. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA McGrawHill, Second Edition

Data Structures through C

I Year – II Semester

Lecture: 3	Practical: 0	Internal Marks: 30
Credits: 4	Tutorial: 1	External Marks: 70

Prerequisites: Problem Solving Approaches

SYLLABUS:

UNIT - I:

Sortings: Bubble sort, Insertion sort, section sort

Searching: linear search, binary search

UNIT II:

Pointers: Introduction, Pointer Arithmetic and Arrays, Memory Allocations Functions ,Compatibility, Lvalue and Rvalue, Arrays and Pointers, Passing an Array to a Function, , Array of Pointers. Pointers For Inter Function Communications, Pointers to Pointers

UNIT III:

Structures: Structure Type Declaration, Initialization, Accessing Structures, Operations on Structures, Complex Structures, Structures and Functions, Sending the Whole Structure, Passing Structures through Pointers.

Unions: Referencing Unions, Initializers, Unions and Structures, Applications.

Text Input/output: Files, Streams, Standard Library Input/Output Functions, Formatting Input/output Functions and Character Input/Output Functions, Command-Line Arguments.

UNIT IV:

Stacks: Definition, Representing stacks, ADT Stack and its operations: Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms. Recursion, Towers of Hanoi problem.

Queues: Queue and its Sequential Representation, Queue as an abstract data type, Types of Queue: Simple Queue, Circular Queue, Operations on each types of Queues: Algorithms.

UNIT V:

Linked lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; **Doubly linked list:** operations and algorithms.

Circular Linked Lists: all operations their algorithms, Linked representation of Stack and Queue. Polynomials: Addition, Multiplication.

TEXT BOOKS:

[1]   ReemaThareja, "Computer Fundamentals and C Programming", Oxford, 2012

[2]   Mark Allen Weiss,"Data structure and Algorithm Analysis in C". Addison Wesley Publication.2006.

[3] SEYMOUR LIPSCHUTZ, "Data Structures With C – by Schaum Series".

REFERENCE BOOKS:

[1]   Horowitz Sahni and Anderson-Freed "Fundamentals of Data Structures in C". 2nd Edition, Universities Press,2008.

[2]   Richard F. Gilberg& B. A. Forouzan "Data Structures A Pseudocode Approcah with C", Second Edition, CENGAGELearning.

Applied chemistry laboratory

I Year – II Semester

Lecture: 0	Practical: 3	Internal Marks: 40
Credits: 1.5	Tutorial: 0	External Marks: 60

Prerequisites: -

List of Experiments:

S.No	Name of the Experiment
1	Introduction to chemistry laboratory
2	Determination of HCl using standard Na_2CO_3 solutions
3	Determination of alkalinity of a sample containing Na2CO3 and NaOH.
4	Determination of temporary and permanent hardness of water using standard EDTA solution.
5	Determination of Copper using standard EDTA solution
6	Determination of ferrous iron using standard $K_2Cr_2O_7$ solution
7	Determination of $KMnO_4$ using standard Oxalic acid solution
8	Determination of pH of the given sample solution using pH meter
9	Conductometric Titrations between strong acid and strong base
10	Potentiometric Titrations between strong acid and strong base
11	Synthesis of Phenol-Formaldehyde resin
12	Synthesis of Urea-Formaldehyde resin
13	Determination of Surface tension of a liquid
14	Determination of Viscosity of a liquid
15	Determination of Flash and Fire point of a lubricant
16	Determination of Cloud and Pour point of a lubricant
17	Determination of Aniline point of a lubricant

Data Structures through C Lab
I Year – II Semester

Lecture: 0   Practical: 3   Internal Marks: 40

Credits: 1.5   Tutorial: 0   External Marks: 60

Prerequisites: C Programming

List of Experiments

1. Write C programs to sort the list of elements using followingtechniques
    a. Bubble Sortb. InsertionSortc. SelectionSort
2. Write C programs to search for an element in an array using following techniques
    a. LinearSearchb. BinarySearch
3. Write a C program to demonstrate call by value and call byreference
4. Write a C program to display student information usingstructures
5. Write a C program to count number of lines, words and characters in a file
6. Write a C program to perform stack operations usingarrays
7. Write a C program to perform queue operations usingarrays
8. Write C program to implement stackapplications.
    a. Conversion of Infix expression to postfixexpression
    b. Evaluation of postfixexpression   c. Towers ofHanoi
9. Write a C program to perform circular queue operations usingarrays

10. Write a C program to implement following operations on Single Linked List
    a. Insertion   b. Deletionc. Search
11. Write a C program to implement following operations on DoubleLinked List
 a. Insertion   b. Deletionc.Search
12. Write a C program to implement stack operations using linkedlist
13. Write a C program to implement queue operations using linkedlist
14. Write a C program to add two polynomials using linkedlist
15. Write a C program to multiply two polynomials using linkedlist

ENVIRONMENTAL STUDIES

I Year – II Semester

Lecture: 2   Practical: 0   Internal Marks: 30

Credits: 0   Tutorial: 0   External Marks: 70

Prerequisites: -

COURSE OUTCOMES:

1. The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.

2. 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

4. The various attributes of the pollution and their impacts and measures to reduce or controlthe pollution along with waste management practices.

5. The environmental legislations of India and Social issues and the possible means

6. Environmental assessment and the stages involved in EIA.

SYLLABUS:

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Introduction- Scope ofEnvironmental 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 EnvirronmentalManagement 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

REFERENCE:
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

	L	T	P	C
	4	0	0	3

COMPILER DESIGN

OBJECTIVES:
- Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.

UNIT – I
Introduction Language Processing, Structure of a compiler the evaluation of Programming language, The Science of building a Compiler application of Compiler Technology. Programming Language Basics.
Lexical Analysis-: The role of lexical analysis buffing, specification of tokens. Recognitions of tokens the lexical analyzer generator lexical

UNIT –II
Syntax Analysis -: The Role of a parser, Context free Grammars Writing A grammar, top down passing bottom up parsing Introduction to Lr Parser.

UNIT –III
More Powerful LR parser (LR1, LALR) Using Armigers Grammars Equal Recovery in Lr parser Syntax Directed Transactions Definition, Evolution order of SDTS Application of SDTS. Syntax Directed Translation Schemes.

UNIT – IV
Intermediated Code: Generation Variants of Syntax trees 3 Address code, Types and Deceleration, Translation of Expressions, Type Checking. Canted Flow Back patching?

UNIT – V
Runtime Environments, Stack allocation of space, access to Non Local date on the stack Heap Management code generation – Issues in design of code generation the target Language Address in the target code Basic blocks and Flow graphs. A Simple Code generation.

UNIT –VI
Machine Independent Optimization. The principle sources of Optimization peep hole Optimization, Introduction to Date flow Analysis.

OUTCOMES:

- Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyzer, and also able to use the Compiler tools like LEX, YACC, etc.
- Parser and its types i.e. Top-down and Bottom-up parsers.
- Construction of LL, SLR, CLR and LALR parse table.
- Syntax directed translation, synthesized and inherited attributes.
- Techniques for code optimization.

TEXT BOOKS:

1. Compilers, Principles Techniques and Tools.Alfred V Aho, Monical S. Lam, Ravi Sethi Jeffery D. Ullman,2nd edition,pearson,2007

2. Compiler Design K.Muneeswaran, OXFORD

3. Principles of compiler design,2nd edition,Nandhini Prasad,Elsebier.

REFERENCE BOOKS:

1. Compiler Construction, Principles and practice, Kenneth C Louden, CENGAGE

2. Implementations of Compiler, A New approach to Compilers including the algebraic methods, Yunlinsu ,SPRINGER

	L	T	P	C
III Year – I Semester	**4**	**0**	**0**	**3**

UNIX PROGRAMMING

OBJECTIVES:
- Written technical communication and effective use of concepts and terminology.
- Facility with UNIX command syntax and semantics.
- Ability to read and understand specifications, scripts and programs.
- Individual capability in problem solving using the tools presented within the class. Students will demonstrate a mastery of the course materials and concepts within in class discussions.

UNIT-I
Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

UNIT-II
The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

UNIT-III
Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

UNIT-IV
Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

UNIT-V
Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The $? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.

UNIT-VI
The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

OUTCOMES:
- Documentation will demonstrate good organization and readability.
- File processing projects will require data organization, problem solving and research.
- Scripts and programs will demonstrate simple effective user interfaces.
- Scripts and programs will demonstrate effective use of structured programming.
- Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.
- Testing will demonstrate both black and glass box testing strategies.
- Project work will involve group participation.

TEXT BOOKS:
1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

REFERENCE BOOKS:
1. Unix and shell programmingby B.M. Harwani, OXFORD university press.

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III Year – I Semester

	L	**T**	**P**	**C**
	4	**0**	**0**	**3**

OBJECT ORIENTED ANALYSIS & DESIGN USING UML

OBJECTIVE:
- To understand how to solve complex problems
- Analyze and design solutions to problems using object oriented approach
- Study the notations of Unified Modeling Language

UNIT-I:
Introduction: The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems, Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

UNIT-II:
Classes and Objects: Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

UNIT-III:
Introduction to UML: Why we model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

UNIT-IV:
Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams.

UNIT-V:
Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

UNIT-VI:
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.
Case Study: The Unified Library application.

OUTCOME:
- Ability to find solutions to the complex problems using object oriented approach
- Represent classes, responsibilities and states using UML notation
- Identify classes and responsibilities of the problem domain

TEXT BOOKS:
1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3rd edition, 2013, PEARSON.
2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 12th Impression, 2012, PEARSON.

REFERENCE BOOKS:
1. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI
2. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O"Reilly
3. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning
1. "The Unified modeling language Reference manual", James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley

	L	T	P	C
III Year – I Semester	4	0	0	3

DATA BASE MANAGEMENT SYSTEMS

OBJECTIVES

- To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

UNIT-I: An Overview of Database Management, Introduction- What is Database System-What is Database-Why Database- Data Independence- Relation Systems and Others- Summary, **Database system architecture, Introduction-** The Three Levels of Architecture-The External Level- the Conceptual Level- the Internal Level- Mapping- the Database Administrator-The Database Management Systems- Client/Server Architecture.

UNIT-II:
The E/R Models, The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and Er Diagrams-Entities Attributes, and Entity Sets-Relationship and Relationship Sets-Conceptual Design With the Er Models, The Relational Model Integrity Constraints Over Relations- Key Constraints –Foreign Key Constraints-General Constraints, Relational Algebra and Calculus, Relational Algebra- Selection and Projection- Set Operation, Renaming – Joins- Division- More Examples of Queries, Relational Calculus, Tuple Relational Calculus- Domain Relational Calculus.

UNIT-III:
Queries, Constraints, Triggers: The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

UNIT-IV:
Schema Refinement (Normalization) : Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

UNIT-V:
Transaction Management and Concurrency Control:

Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and save point.

Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods : lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering : Wait/Die and Wound/Wait Schemes, Database Recovery management : Transaction recovery.

UNIT-VI:
Overview of Storages and Indexing, Data on External Storage- File Organization and Indexing – Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based Indexing – Tree-Based Indexing, Comparison of File Organization

OUTCOMES
- Describe a relational database and object-oriented database.
- Create, maintain and manipulate a relational database using SQL
- Describe ER model and normalization for database design.
- Examine issues in data storage and query processing and can formulate appropriate solutions.
- Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
- Design and build database system for a given real world problem

TEXT BOOKS:
1. Introduction to Database Systems, CJ Date, Pearson
2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition
3. Database Systems - The Complete Book, H G Molina, J D Ullman, J Widom Pearson

REFERENCES BOOKS:
1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
   3. Introduction to Database Systems, C.J.Date Pearson Education

	L	**T**	**P**	**C**
III Year – I Semester	**4**	**0**	**0**	**3**

OPERATING SYSTEMS

OBJECTIVES:

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

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

UNIT-II:
Process Management – Process concept, The process, Process State Diagram , Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

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:
Concurrency: ProcessSynchronization, 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-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,

UNIT VI:

Linux System: Components of LINUX, Interprocess Communication, Synchronisation, Interrupt, Exception and System Call.

Android Software Platform: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management

OUTCOMES:

- Design various Scheduling algorithms.

- Apply the principles of concurrency.

- Design deadlock, prevention and avoidance algorithms.

- Compare and contrast various memory management schemes.

- Design and Implement a prototype file systems.

- Perform administrative tasks on Linux Servers

- Introduction to Android Operating System Internals

TEXT BOOK:

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.

UNIFIED MODELING LAB

OBJECTIVES:

- Construct UML diagrams for static view and dynamic view of the system.
- Generate creational patterns by applicable patterns for given context.
- Create refined model for given Scenario using structural patterns.
- Construct behavioral patterns for given applications.

<u>Week 1:</u>
Familiarization with Rational Rose or Umbrello

For each case study:

<u>Week 2, 3 & 4:</u>
For each case study:
- a) Identify and analyze events
- b) Identify Use cases
- c) Develop event table
- d) Identify & analyze domain classes
- e) Represent use cases and a domain class diagram using Rational Rose
- f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

<u>Week 5 & 6:</u>
- **For each case study:**
- a) Develop Use case diagrams
- b) Develop elaborate Use case descriptions & scenarios
- c) Develop prototypes (without functionality)
- d) Develop system sequence diagrams

<u>Week 7, 8, 9 & 10:</u>
For each case study:
- a) Develop high-level sequence diagrams for each use case
- b) Identify MVC classes / objects for each use case
- c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
- d) Develop detailed design class model (use GRASP patterns for responsibility assignment)
- e) Develop three-layer package diagrams for each case study

<u>Week 11 & 12:</u>
- **For each case study:**
- a) Develop Use case Packages
- b) Develop component diagrams
- c) Identify relationships between use cases and represent them
- d) Refine domain class model by showing all the associations among classes

- **<u>Week 13 onwards:</u>**
- **For each case study:**

- a) Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

   OUTCOMES:
- Understand the Case studies and design the Model.
- Understand how design patterns solve design problems.
- Develop design solutions using creational patterns.

Construct design solutions by using structural and behavioral patterns

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OPERATING SYSEMS AND LINUX PROGRAMMING LAB

OBJECTIVES:

- To understand the design aspects of operating system.
- To study the process management concepts & Techniques.
- To study the storage management concepts.
- To familiarize students with theLinux environment
- To learn the fundamentals of shell scripting/programming
- To conceptualize Data Mining and the need for pre-processing.
- To learn the algorithms used for various types of Data Mining Problem

OPERATING SYSTEMS

1. Simulate the following CPU scheduling algorithms

   a) Round Robin b) SJF c) FCFS d) Priority

2. Multiprogramming-Memory management- Implementation of fork (), wait (), exec() and exit (), System calls

3. Simulate the following

   a) Multiprogramming with a fixed number of tasks (MFT)

   b) Multiprogramming with a variable number of tasks (MVT)

4. Simulate Bankers Algorithm for Dead Lock Avoidance

5. Simulate Bankers Algorithm for Dead Lock Prevention.

6. Simulate the following page replacement algorithms.

   a) FIFO b) LRU c) LFU

7. Simulate the following File allocation strategies

   a) Sequenced b) Indexed c) Linked

LINUX PROGRAMMING

1. a) Study of Unix/Linux general purpose utility command list

   man,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.

   b) Study of vi editor.

   c) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.

   d) Study of Unix/Linux file system (tree structure).

   e) Study of .bashrc, /etc/bashrc and Environment variables.

2.Write a C program that makes a copy of a file using standard I/O, and system calls

3. Write a C program to emulate the UNIX ls –l command.

4. Write a C program that illustrates how to execute two commands concurrently
   with a command pipe.

                    Ex: - ls –l | sort

5. Write a C program that illustrates two processes communicating using sharedmemory

6. Write a C program to simulate producer and consumer problem usingsemaphores

7. Write C program to create a thread using pthreads library and let it run its function.

8. Write a C program to illustrate concurrent execution of threads using pthreads library.

OUTCOMES:

- To use Unix utilities and perform basic shell control of the utilities
- To use the Unix file system and file access control.
- To use of an operating system to develop software
- Students will be able to use Linux environment efficiently
- Solve problems using bash for shell scripting
- Will be able to implement algorithms to solve data mining problems using weka tool

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III Year – I Semester	**0**	**0**	**3**	**2**

DATA BASE MANAGEMENT SYSTEM LAB

OBJECTIVES:

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.

- To familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented framework

- To give a good formal foundation on the relational model of data

- To present SQL and procedural interfaces to SQL comprehensively

- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

List of Experiments:

SQL

1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.

2. Queries using operators in SQL

3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update

4. Queries using Group By, Order By, and Having Clauses

5. Queries on Controlling Data: Commit, Rollback, and Save point

6. Queries to Build Report in SQL *PLUS

7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints

8. Queries on Joins and Correlated Sub-Queries

9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

PL/SQL

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of

Assignment Operation

11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL

12. Write a PL/SQL block using SQL and Control Structures in PL/SQL

13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types

14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS

15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc. 18

16. Demonstration of database connectivity

OUTCOMES:
- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-artRDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using a 4GL

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

Text Books/Suggested Reading:
1. Oracle: The Complete Reference by Oracle Press
2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007.
3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007

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III Year – I Semester	0	3	0	0

PROFESSIONAL ETHICSAND HUMAN VALUES

Course Objectives:

*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

UNIT I: Human Values:
Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality-Character.

UNIT: II: Principles for Harmony:
Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT III: Engineering Ethics and Social Experimentation:
History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument – Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past – Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV: Engineers' Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V: Engineers' Duties and Rights:

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes-Industrial Espionage- Price Fixing-Whistle Blowing.

UNIT VI: Global Issues:

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

- Related Cases Shall be dealt where ever necessary.

Outcome:
*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

References:

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi.
2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger - Tata McGraw-Hill – 2003.
3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana - Maruthi Publications.
4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.
7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran – University Science Press.
8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013
9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

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III Year – II Semester

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COMPUTER NETWORKS

OBJECTIVES:

- Understand state-of-the-art in network protocols, architectures, and applications.
- Process of networking research
- Constraints and thought processes for networking research
- Problem Formulation—Approach—Analysis—

UNIT – I:
Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models

UNIT – II:
Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel - Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing
Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

UNIT – III:
The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N-A Protocol Using Selective Repeat

UNIT – IV:
The Medium Access Control Sublayer-The Channel Allocation Problem-Static Channel Allocation-Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols-Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless Lans-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sublayer Protocol-The 805.11 Frame Structure-Services

UNIT – V:
Design Issues-The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service-Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path Algorithm, Congestion Control Algorithms-Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding.

UNIT – VI:
Transport Layer – The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp
Application Layer –The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery

OUTCOMES:

- Understand OSI and TCP/IP models
- Analyze MAC layer protocols and LAN technologies
- Design applications using internet protocols
- Understand routing and congestion control algorithms
- Understand how internet works

TEXT BOOKS:
1. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010
2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education

REFERENCE BOOKS:
1. Larry L. Peterson and Bruce S. Davie, "Computer Networks - A Systems Approach" (5th ed), Morgan Kaufmann/ Elsevier, 2011

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III Year – II Semester	**4**	**0**	**0**	**3**

DATA WARE HOUSING AND DATA MINING

OBJECTIVES:
- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

UNIT –I:
Introduction:Why Data Mining? What Is Data Mining?1.3 What Kinds of Data Can Be Mined?1.4 What Kinds of Patterns Can Be Mined?Which Technologies Are Used?Which Kinds of Applications Are Targeted?Major Issues in Data Mining.Data Objects and Attribute Types,Basic Statistical Descriptions of Data,Data Visualization, Measuring Data Similarity and Dissimilarity

UNIT –II:
Data Pre-processing: Data Preprocessing: An Overview,Data Cleaning,Data Integration,Data Reduction,Data Transformation and Data Discretization

UNIT –III:
Classification: Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

UNIT –IV:
Classification: Alterative Techniques, Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

UNIT –V
Association Analysis: Basic Concepts and Algorithms: Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. **(Tan &Vipin)**

UNIT –VI
Cluster Analysis: Basic Concepts and Algorithms:Overview: What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. **(Tan &Vipin)**

OUTCOMES:
- Understand stages in building a Data Warehouse
- Understand the need and importance of preprocessing techniques
- Understand the need and importance of Similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for Association Rules.
- Analyze Classification and Clustering algorithms

TEXT BOOKS:
1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

REFERENCE BOOKS:
1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining : VikramPudi and P. Radha Krishna, Oxford.
3. Data Mining and Analysis - Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.

DESIGN AND ANALYSIS OF ALGORITHMS

OBJECTIVES:

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

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations

UNIT-I:
Introduction: What is an Algorithm, Algorithm Specification, Pseudocode Conventions Recursive Algorithm, Performance Analysis, Space Complexity, Time Complexity, Amortized Complexity, Amortized Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement.

UNIT-II:
Dived and Conquer: General Method, Defective Chessboard, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort, Performance Measurement, Randomized Sorting Algorithms.

UNIT-III:
The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees, Prim's Algorithm, Kruskal's Algorithms, An Optimal Randomized Algorithm, Optimal Merge Patterns, Single Source Shortest Paths.

UNIT-IV:
Dynamic Programming: All - Pairs Shortest Paths, Single – Source Shortest paths General Weights, String Edition, 0/1 Knapsack, Reliability Design,

UNIT-V:
Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring , Hamiltonian Cycles.

UNIT-VI:
Branch and Bound: The Method, Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem, LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson.

OUTCOMES:
Students who complete the course will have demonstrated the ability to do the following:

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.

TEXT BOOKS:

1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press
2. Introduction to AlgorithmsThomas H. Cormen, PHI Learning

REFERENCE BOOKS
1. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman
2. Algorithm Design, Jon Kleinberg, Pearson.

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III Year – II Semester	**4**	**0**	**0**	**3**

SOFTWARE TESTING METHODOLOGIES

OBJECTIVE:
Fundamentals for various testing methodologies.

- Describe the principles and procedures for designing test cases.
- Provide supports to debugging methods.
- Acts as the reference for software testing techniques and strategies.

UNIT-I:
Introduction: Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs,Taxonomy of Bugs.
Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates andAchievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

UNIT-II:
Transaction Flow Testing: Transaction Flows, Transaction Flow Testing Techniques.
Dataflow testing: Basics of Dataflow Testing, Strategies in Dataflow Testing, Application ofDataflow Testing.

UNIT-III:
Domain Testing: Domains and Paths, Nice & Ugly Domains, Domain testing, Domains andInterfaces Testing, Domain and Interface Testing, Domains and Testability.

Paths, Path products and Regular expressions: Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

UNIT-IV:
Syntax Testing: Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips.
Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

UNIT – V:
State, State Graphs and Transition Testing: State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

UNIT -VI:
Software Testing Tools: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

OUTCOME:
- Understand the basic testing procedures.

- Able to support in generating test cases and test suites.

- Able to test the applications manually by applying different testing methods and automation tools.
- Apply tools to resolve the problems in Real time environment.

TEXT BOOKS:
1. Software testing techniques – Boris Beizer, Dreamtech, second edition.

2. Software Testing- Yogesh Singh, Camebridge

REFERENCE BOOKS:

1. The Craft of software testing - Brian Marick, Pearson Education.

2. Software Testing, 3rd edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
3. Software Testing, N.Chauhan, Oxford University Press.

4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.

5. Effective methods of Software Testing, Perry, John Wiley, 2nd Edition, 1999.
6. Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press
7. Win Runner in simple steps by Hakeem Shittu, 2007Genixpress.
8. Foundations of Software Testing, D.Graham& Others, Cengage Learning.

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ARTIFICIAL INTELLIGENCE
(Open Elective)

OBJECTIVES:
- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

UNIT-I:
Introduction to artificial intelligence: Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

UNIT-II:
Problem solving: state-space search and control strategies : Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a*, constraint satisfaction
Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games

UNIT-III:
Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-IV:
Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames **advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

UNIT-V:
Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

UNIT-VI:

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

OUTCOMES:
- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

TEXT BOOKS:
1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2^{nd}ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3^{rd}ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

REFERNCE BOOKS:
1. Atificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5^{th}ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

INTERNET OF THINGS
(Open Elective)

OBJECTIVES:
- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

UNIT - I:
The Internet of Things: An Overview of Internet of things,Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples OF IoTs, Design Principles For Connected Devices

UNIT – II:
Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT – III:
 Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT– IV:
Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT– V:
 Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in

the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT – VI

Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology ,Sensing the World.

OUTCOMES:
- Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
- Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things
- Develop critical thinking skills
- Compare and contrast the threat environment based on industry and/or device type

TEXTBOOKS:

- Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education
- Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

REFERNCE BOOKS:

1. Designingthe Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things CunoPfister , Oreilly

CYBER SECURITY
(Open Elective)

OBJECTIVES:
- The Cyber security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
- Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

UNIT- I: Introduction to Cybercrime:
Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security ,Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens

UNIT -II: Cyber offenses:
How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

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, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT -IV: Tools and Methods Used in Cybercrime:
Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft:Introduction,Phishing,IdentityTheft(IDTheft)

UNIT -V: Cybercrimes and Cyber security:
Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program, Continuing Strategies.

UNIT -VI: Understanding Computer Forensics:

Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Antiforensics

OUTCOMES:

- Cyber Security architecture principles
- Identifying System and application security threats and vulnerabilities
- Identifying different classes of attacks
- Cyber Security incidents to apply appropriate response
- Describing risk management processes and practices
- Evaluation of decision making outcomes of Cyber Security scenarios

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, Wiley.
2. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, Cengage Learning.

REFERENCES:

1. Information Security, Mark Rhodes, Ousley, MGH.

DIGITAL SIGNAL PROCESSING
(Open Elective)

OBJECTIVES:
- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the non-parametric methods of power spectrum estimations
- To study the fundamentals of digital signal processors.

UNIT -I
Discrete Fourier Transform
DFT and its properties, Relation between DTFT and DFT, FFT computations using Decimation in time and Decimation in frequency algorithms, Overlap-add and save methods

UNIT -II
Infinite Impulse Response Digital Filters
Review of design of analogue Butterworth and Chebyshev Filters, Frequency transformation in analogue domain - Design of IIR digital filters using impulse invariance technique - Design of digital filters using bilinear transform - pre warping - Realization using direct, cascade and parallel forms.

UNIT- III
Finite Impulse Response Digital Filters
Symmetric and Ant symmetric FIR filters - Linear phase FIR filters - Design using Hamming, Henning and Blackman Windows - Frequency sampling method - Realization of FIR filters - Transversal, Linear phase and Polyphasestructures.

UNIT -IV
Finite Word Length Effects
Fixed point and floating point number representations - Comparison - Truncation and Rounding errors - Quantization noise - derivation for quantization noise power - coefficient quantization error - Product quantization error –

UNIT -V
Overflow error - Round off noise power - limit cycle oscillations due to product round off and overflow errors - signal scaling

UNIT -VI
Multirate Signal Processing
Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase implementation of FIR filters for interpolator and decimator -Multistage implementation of sampling rate conversion- Design of narrow band filters - Applications of Multirate signal processing.

OUTCOMES:
- an ability to apply knowledge of Mathematics, science, and engineering
- an ability to design and conduct experiments and interpret data
- an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- an ability to function as part of a multi-disciplinary team

TEXT BOOKS:
1. John G Proakis and Manolakis, "Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007.
2. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, TMH/McGraw HillInternational, 2007

REFERENCE BOOKS:
1. E.C. Ifeachor and B.W. Jervis, " Digital signal processing - A practical approach", Second edition, Pearson, 2002.
2. S.K. Mitra, Digital Signal Processing, A Computer Based approach, Tata Mc GrawHill, 1998.
3. P.P.Vaidyanathan, Multirate Systems & Filter Banks, Prentice Hall, Englewood cliffs, NJ, 1993.
4. Johny R. Johnson, Introduction to Digital Signal Processing, PHI, 2006.
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EMBEDDED SYSTEMS
(Open Elective)

OBJECTIVES:
- Technology capabilities and limitations of the hardware, software components
- Methods to evaluate design tradeoffs between different technology choices.
- Design Methodologies

UNIT-I:
Introduction to Embedded systems: What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

UNIT-II:
8—bit microcontrollers architecture: Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

UNIT-III:
RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

UNIT-IV:
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-V:
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-VI:
Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

OUTCOMES:

Understand the basics of an embedded system
- Program an embedded system
- Design, implement and test an embedded system.

Identify the unique characteristics of real-time systems
- Explain the general structure of a real-time system
- Define the unique design problems and challenges of real-time systems

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, Pearson.
4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

ROBOTICS
(Open Elective)

OBJECTIVES:
- To introduce the basic concepts, parts of robots and types of robots.
- To make the student familiar with the various drive systems for robot, sensors and their applications in robots and programming of robots.
- To discuss about the various applications of robots, justification and implementation of robot.

UNIT- I:
Introduction
Specifications of Robots- Classifications of robots – Work envelope - Flexible automation versus Robotic technology – Applications of Robots ROBOT KINEMATICS AND DYNAMICS Positions,

UNIT-II:
Orientations and frames, Mappings
Changing descriptions from frame to frame, Operators: Translations, Rotations and Transformations - Transformation Arithmetic - D-H Representation - Forward and inverse Kinematics Of Six Degree of Freedom Robot Arm – Robot Arm dynamics

UNIT- III:
Robot Drives and Power Transmission Systems
Robot drive mechanisms, hydraulic – electric – servomotor- stepper motor - pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Link - Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws,

UNIT -IV:
Manipulators
Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators

UNIT- V:
Robot End Effectors
Classification of End effectors – Tools as end effectors. Drive system for grippers-Mechanical adhesive-vacuum-magnetic-grippers. Hooks&scoops. Gripper force analysis and gripper design. Active and passive grippers.

UNIT -VI:
Path planning & Programming
Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion – straight line motion-Robot languages-computer control and Robot software.

OUTCOMES:
- The Student must be able to design automatic manufacturing cells with robotic control using
- The principle behind robotic drive system, end effectors, sensor, machine vision robot Kinematics and programming.

TEXT BOOKS:
1. Deb S. R. and Deb S., "Robotics Technology and Flexible Automation", Tata McGraw HillEducation Pvt. Ltd, 2010.
2. John J.Craig, "Introduction to Robotics", Pearson, 2009.
3. Mikell P. Grooveret. al., "Industrial Robots - Technology, Programming and Applications", McGraw Hill, New York, 2008.

REFERENCE BOOKS:
1. Richard D Klafter, Thomas A Chmielewski, Michael Negin, "Robotics Engineering – An Integrated Approach", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd., 2006.
2. Fu K S, Gonzalez R C, Lee C.S.G, "Robotics: Control, Sensing, Vision and Intelligence", McGraw Hill, 1987

L	T	P	C
0	0	3	2

NETWORK PROGRAMMING LAB

OBJECTIVES:
- To write, execute and debug c programs which use Socket API.
- To understand the use of client/server architecture in application development
- To understand how to use TCP and UDP based sockets and their differences.
- To get acquainted with unix system internals like Socket files, IPC structures.
- To Design reliable servers using both TCP and UDP sockets

Prerequisites:

 Knowledge of C Programming, Basic commands of UNIX.

List of Programs

1. Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, traceroute, whoisetc. Usage of elementary socket system calls (socket (), bind(), listen(), accept(),connect(),send(),recv(),sendto(),recvfrom()).

2. Implementation of Connection oriented concurrent service (TCP).

3. Implementation of Connectionless Iterative time service (UDP).

 4. Implementation of Select system call.

5. Implementation of gesockopt (), setsockopt () system calls.

6. Implementation of getpeername () system call.

7. Implementation of remote command execution using socket system calls.

 8. Implementation of Distance Vector Routing Algorithm.

9. Implementation of SMTP.

10. Implementation of FTP.

11. Implementation of HTTP.

12. Implementation of RSA algorithm.

Note: Implement programs 2 to 7 in C and 8 to 12 in JAVA.

OUTCOMES:
- Understand and explain the basic concepts of Grid Computing;
- Explain the advantages of using Grid Computing within a given environment;
- Prepare for any upcoming Grid deployments and be able to get started with a potentially available Grid setup.
- Discuss some of the enabling technologies e.g. high-speed links and storage area networks.
- Build computer grids.

SUGGESTED READING:

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

SOFTWARE TESTING LAB

OBJECTIVES:
- Demonstrate the UML diagrams with ATM system descriptions.
- Demonstrate the working of software testing tools with c language.
- Study of testing tools- win runner, selenium etc.
- Writing test cases for various applications

1   Write programs in 'C' Language to demonstrate the working ofthe following constructs:

       i)   do...while

       ii)   while….do

       iii)   if…else

       iv)   switch

       v)   for

2   "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.

3   Take any system (e.g. ATM system) and study its system specifications and report the various bugs.

4   Write the test cases for any known application (e.g. Banking application)

5   Create a test plan document for any application (e.g. Library Management System)

6   Study of Win Runner Testing Tool and its implementation

      a)   Win runner Testing Process and Win runner User Interface.

      b)   How Win Runner identifies GUI(Graphical User Interface) objects in an application and describes the two modesfor organizing GUI map files.

      c)   How to record a test script and explains the basics of Test Script Language (TSL).

      d)   How to synchronize a test when the application responds slowly.

      e)   How to create a test that checks GUI objects and compare the behaviour of GUI objects in different versions of the sample application.

      f)   How to create and run a test that checks bitmaps in your application and run the test on different versions ofthe sample application and examine any differences, pixel by pixel.

g) How to Create Data-Driven Tests which supports to run a single test on several sets of data from a data table.

h) How to read and check text found in GUI objects and bitmaps.

i) How to create a batch test that automatically runs the tests.

j) How to update the GUI object descriptions which in turn supports test scripts as the application changes.

7 Apply Win Runner testing tool implementation in any real time applications.

OUTCOMES:
- Find practical solutions to the problems
- Solve specific problems alone or in teams
- Manage a project from beginning to end
- Work independently as well as in teams

Define, formulate and analyze a problem

	L	T	P	C
III Year – II Semester	0	0	3	2

DATA WARE HOUSING AND DATA MINING LAB

OBJECTIVES:
- Practical exposure on implementation of well known data mining tasks.
- Exposure to real life data sets for analysis and prediction.
- Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
- Handling a small data mining project for a given practical domain.

System/Software Requirements:

- **Intel based desktop PC**
- **WEKA TOOL**

1. Demonstration of preprocessing on dataset student.arff

2. Demonstration of preprocessing on dataset labor.arff

3. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm

4. Demonstration of Association rule process on dataset test.arff using apriori algorithm

5. Demonstration of classification rule process on dataset student.arff using j48 algorithm

6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm

7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm

8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm

9. Demonstration of clustering rule process on dataset iris.arff using simple k-means

10. Demonstration of clustering rule process on dataset student.arff using simple k- means.

OUTCOMES:

- The data mining process and important issues around data cleaning, pre-processing and integration.
- The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction..

	L	T	P	C
III Year - II Semester	0	2	0	0

INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Objectives:
*To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.
*Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

Unit I: Introduction to Intellectual Property Rights (IPR)

Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

Unit II: Copyrights and Neighboring Rights

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers **–** Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

UNIT III: Patents

Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

UNIT IV: Trademarks

Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V: Trade Secrets

Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law.

UNIT VI: Cyber Law and Cyber Crime

Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality - Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

- Relevant Cases Shall be dealt where ever necessary.

Outcome:

* **IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.**

*Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.**

References:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
3. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
5. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
6. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
7. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

LINEAR ALGEBRA & DIFFERENTIAL EQUATIONS
I Year – I Semester

Lecture: 3	Practical: 0	Internal Marks: 30
Credits: 4	Tutorial: 1	External Marks: 70

Prerequisites: -

Course Outcomes:

1. Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations

2. Illustrate the methods of computing eigen values and eigen vectors

3. Able to analyze the real life situations, formulate the differential equations then apply the solving methods

4. Explain the techniques of solving the linear differential equations

5. Optimize functions of several variables and able to find extreme values of constrained functions

Syllabus:

UNIT I: Linear systems of equations, Eigen values & Eigen vectors

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence, Consistency of linear system of equations, System of linear homogeneous equations.Gauss -Jordan method, LU decomposition method,

Application: Finding the current inelectrical circuits, Eigen values, Eigen vectors, Properties of Eigen values(without proofs).

UNIT II: Quadratic forms & Differential calculus:

Cayley-Hamilton theorem(without proof), Reduction to diagonal form, Reduction of quadratic form to canonical form, Nature of quadratic form. Limits and continuity and differentiability, Mean value theorems, Taylor's and Maclaurin's series.Functions of two variables, Partial derivatives, Homogeneous functions, Total derivative, Jacobian, Taylor's theorem for functions of two variables.

Applications: Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

UNIT III: Differential equations of first order:

Formation of a differential equation, Solution of a differential equation, Variables separable method, 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.

UNIT IV: Differential equations higher order:

Definitions, Complete solution, Operator D, Rules to find Complementary function, Inverse operator, Rules to find the particular integral(RHS term of the type e^{ax} , Sin(ax+b), cos(ax+b), polynomials in x).Rules to find the particular integral(RHS term of the type e^{ax} V(x), any other function), Method of variation of parameters.

Application: L-C-R circuits.

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

Text Books:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rdEdition, 2014.

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

Reference Books:

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

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

Problem Solving Approaches

I Year – I Semester

Lecture: 3   Practical: 0   Internal Marks: 30

Credits: 3   Tutorial: 0   External Marks: 70

Prerequisites: -
Course Outcomes
       The student will learn
1. To formulate simple algorithms for arithmetic, logical problems and translate them to programs in c language.
2. To implement conditional branching, iteration and recursion.
3. To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
4. To use arrays, pointers and structures to formulate algorithms and programs.
5. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
6. To use structures and files

SYLLABUS

UNIT – I:

Introduction to Computer Problem Solving: Programs and Algorithms, characteristics of an algorithm, Flowchart,Pseudo-code, TheProblem – Solving Aspect, Top-Down design

Fundamental Algorithms Introduction,Summation of a set of numbers, Factorial computation, Generation of Fibonacci sequence, reversing the digits of an Integer.

UNIT – II:

Factoring Methods: Introduction,GCD of two Integers, Generating Prime numbers, Computing the Prime Factors of an Integer, Generation of pseudo-random numbers

Array Techniques: Introduction, Array Order Reversal, Finding the Maximum number in a set, Removal of duplicates from an ordered array, Partitioning an Array

UNIT-III:

Programming Languages and Introduction to C Programming: Properties of Machine Language, Assembly Language, High-Level Languages, Procedural and Object-Oriented Languages.Structure of C program, Indentation, Comments,Identifiers& variables, DataTypes

Interactive Input, Formatted Output, FormatModifiers, Operators, Operator precedence &

Associativity, Relational expressions, Type Casting,Mathematical Library Functions, Selection control statements: if and switch

UNIT -IV:

Repetition structures: Basic Loop Structures: while, for , do-while, Nested loops, **Modular Programming:** Functions and parameter declarations, Returning a Value,Functions with Empty Parameter Lists,Variable Scope

Modular Programming Variable Storage Class: Local, Global,**Pointers:** declaration and its usage, Functions with parameters: pass by value, pass by address, pointer to a function and function pointer

UNIT-V:

Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays-Matrices

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions related to strings.

TEXT BOOKS:

 [1]   R.G. Dromey, "How to Solve it By Computer", Prentice-Hall International Series in Computer Science,1982.

 [2]   ReemaThareja, "Computer Fundamentals and C Programming", Oxford, 2012

REFERENCE BOOKS:

[1]   DENNIS M. RITCHIE, BRIAN W KERNIGHAN, " The C Programming Language", Prentice-Hall International Series in Computer Science, Second Edition.
[2]   Michael Schneider, Steven W. Weingart, David M. Perlman, "An Introduction toProgrammingandProblemSolvingWithPascal",JohnWileyandSonsInc ,1984.

[3] David Gries, "The Science of Programming", Springer Verlag,1981.

ENGINEERING GRAPHICS

I Year – I Semester

Lecture: 3   Practical: 0   Internal Marks: 30

Credits: 3   Tutorial: 0   External Marks: 70

Prerequisites: -

Course Outcomes:

1: Draw the polygons, ellipse, parabola, hyperbola, cycloids and involutes for various types of profiles.

2: Construction of various scales like plain, diagonal and venier scales .Draw the orthographic projections of the points, lines.

3: Draw the projections of planes.

4: Draw the projections of solids

5: Convert Orthographic projections to isometric projection and vice versa.

SYLLABUS:

UNIT I:

Lettering,Dimensioning, Geometrical Constructions. Polygons: General construction method, Inscribing and describing methods. Cycloids: Cycloid, Epicycloid, Hypocycloid and Involutes-Tangent and Normals to the above curves.

UNIT II :

Orthographic projections: Introduction, Projections of points.

Projections of straight lines- parallel to both the planes, parallel to one plane and inclined to the other plane.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

UNIT III

Projections of planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane, Projections of planes inclined to both the reference planes.

UNIT IV: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the reference planes.

Sections of solids: Prisms, Pyramids, Cones and Cylinders in simple positions.

UNIT V:Isometric Projections: Isometric views/projections of planes and simple solids, Conversion of orthographic views to isometric views. Conversion of isometric views to orthographic views. Introduction to AutoCAD

Text Books:

1. Engineering Drawing, N. D. Butt, Chariot Publications
2. Engineering Drawing +Auto CAD, K Venugopal&V Prabhuraja, Newage Publishers.

Reference Books:

1. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
2. Engineering Graphics for Degree, K. C. John, PHI Publishers
3. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
4. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

Problem Solving Approaches Lab

I Year – I Semester

Lecture: 2	Practical: 3	Internal Marks: 40
Credits: 1.5	Tutorial: 0	External Marks: 60

Prerequisites: -

List of Experiments:

1. a. Write an algorithm, flowchart and pseudo code to perform all arithmeticoperations
   b. Write an algorithm, flowchart and pseudo code to find average of threenumbers
   c. Write an algorithm, flowchart and pseudo code to find smallest of threenumbers
2. a. Write an algorithm, flowchart and pseudo code for finding smallest divisor ofan integer.
   b. Write an algorithm, flowchart and pseudo code to find x^y
3. Write a C program to convert temperature from Fahrenheit to Celsius and viceversa.
4. Write a C program to find the roots of quadraticequation
5. Write a C program to find whether a given number isprime
6. Write a C program find whether a given number isarmstrong
7. Write a C program to display reverse of a givennumber
8. Write a C program to generate first n- terms of a fibonaccisequence.
9. Write a C program to calculate sin(x) value, where x is input given byuser
10. Write a C program to calculate cos(x) value, where x is input given byuser
11. Write a C program to perform operations on one dimensionalarray
    a. Smallest element of anarray
    b. Largest element of an array
    c. swap smallest and largest element in anarray
12. Write a C program to implement thefollowing
    a. Addition of twomatrices
    b. Multiplication of twomatrices
13. Write a C program to perform the following operations on strings without using string handlingfunctions
    a. To display length of thestring
    b. To check whether a string ispalindrome
    c. To delete n characters from a given position in a givenstring
14. Write recursive and non recursive programs for thefollowing
    a. Factorial of anumber
    b. GCD of twonumbers
    c. Fibonacciseries
15. Write a program which illustrates Storageclasses

IT WORKSHOP

I Year – I Semester

Lecture: 2	Practical: 2	Internal Marks: 40
Credits: 1	Tutorial: 0	External Marks: 60

Prerequisites: -

LIST OF EXPERIMENTS:

1. **System Assembling, Disassembling and identification of Parts / Peripherals**

2. **Operating System Installation**-Install Operating Systems like Windows, Linux .

3**. MS-Office**

     a. **Word** - Formatting, Page Borders, Reviewing, Equations, symbols.

     b. **Spread Sheet** - organize data, usage of formula, graphs, charts.

     c. **Power point** - features of power point, guidelines for preparing an effective

presentation.

     d. **Access**- creation of database, validate data.

4. **Network Configuration & Software Installation**-Configuring TCP/IP, proxy and firewall

settings. Installing application software, system software & tools.

5. **Internet and World Wide Web**-Search Engines, Types of search engines, netiquette, cyber

hygiene.

6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

7. **MATLAB-** basic commands, subroutines, graph plotting.

8. **LATEX**-basic formatting, handling equations and images.

Text Books:

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L.
James, Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition by
Gary B. Shelly, Misty E. Vermaat and Thomas J.
3. LATEX- User's Guide and Reference manual, Leslie Lamport, Pearson, LPE, 2/e.
4. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers,
Rudraprathap, Oxford University Press, 2002.
5. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
6. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.
7. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
8. Introduction to Information Technology, ITL Education Solutions limited, Pearson
      Education.

VECTOR CALCULUS & FOURIER TRANSFORMS

I Year – II Semester

Lecture: 3   Practical: 0   Internal Marks: 30

Credits: 3   Tutorial: 0   External Marks: 70

Prerequisites: -

SYLLABUS:

UNIT I: Special functions &Multiple integrals:

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

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

UNIT II: Vector Calculus:

Vector Differentiation: Introduction, Scalar and Vector point functions, Del applied to scalar point functions-Gradient, Del applied to vector point functions-Div& Curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

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

UNIT III: Fourier Series:

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

UNIT IV: Fourier Transforms:

Fourier Integral, Fourier cosine & sine integral, complex forms of Fourier integral.

Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms(without proof), Convolution theorem(without proof), finite Fourier sine & cosine transforms.

UNIT V: Applications of Partial Differential Equations:

Definition of PDE, Classification of 2nd order PDE, Variable separable method, Vibrations of a stretched string – Wave equation.One-dimensional heat flow, Two-dimensional heat flow, Solution of Laplace's equation.

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, 1st Edition, 2007.

Reference Books:

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

Biology for Engineers

I Year – II Semester

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

Prerequisites: -

COURSE OUTCOMES:

After studying the course, the student will be able to:

1: Understand how biological observations lead to major discoveries and the morphological,Biochemical and ecological classification of organisms.

2:Understand that all forms of life have the same building blocks and their involvement in the Maintenance and metabolic processes of living organisms.

3:Classify enzymes and distinguish between different mechanisms of enzyme action andStudy the chemical reactions that are catalyzed by enzymes. Apply thermodynamic, Principles to biological systems and able to understand major chemical processes that occur, Within a living organism in order to maintain life.

4: Identify DNA as a genetic material in the molecular basis of information transfer.

5: Identify and classify microorganisms, understand media compositions and growth of Microorganisms

SYLLABUS:

Unit-1: Introduction

Importance and need of biology- Discoveries of biology in 18th Century: Brownian motion and the origin of thermodynamics- their importance in any scientific inquiry.

Classification of organisms based on (a) Cellularity- Unicellular or Multicellular , (b) Ultra structure- prokaryotes or eucaryotes. (c) Energy and carbon utilization -autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricoteliec, ureotelic (e) Habitat- acquatic or terrestrial (f) Molecular taxonomy- three major kingdoms of life.

Unit-2: Biomolecules

Introduction to molecules of life-monomeric units and polymeric structures of carbohydrates, Sugars, starch and cellulose, amino acids and proteins structure and function.

Nucleotides and DNA/RNA, Hierarchy of DNA Structure- from single stranded to double helix, two carbon units and lipids.

Unit-3: Enzymes & Metabolism

Enzyme classification, mechanism of enzyme action, enzyme kinetics and kinetic parameters.\
Thermodynamics as applied to biological systems, endergonic and exergoinc reactions, Concept of kinetic equilibrium and its relation to standard free energy Spontaneity, ATP as an energy currency, Glycolysis, Krebs cycle and Energy yielding and energy consuming reactions.

Unit-4: Information Transfer

Concept of genetic code, Molecular basis of information transfer; Transcription and translation.

Unit-5: Microbiology

Concept of species and strains, Identification of Micro organisms.
 Sterilization and media compositions, Growth kinetics.

Text/Reference Books:

1) Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M,
   L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
2) Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley
and Sons
3) Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and
Company
4) Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and
company, Distributed by Satish Kumar Jain for CBS Publisher
5) Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C.
   Brown Publishers

Basic Electrical & Electronics Engineering
I Year – II Semester

Lecture: 3   Practical: 0   Internal Marks: 30

Credits: 3   Tutorial: 0   External Marks: 70

Prerequisites: -

SYLLABUS:

Unit – I: Electric Circuits

Basic definitions, Types of network elements & sources, Ohms law, Kirchhoff's laws, Series & parallel circuits.Source transformation, Network reduction reductions, Introduction to AC circuits.

Unit – II: Electrical Machines

Basic laws – Faraday's laws of electromagnetic induction, Lenz's law, Right hand thumb rule, Fleming's left hand and right hand rules,Construction, working principle and applications of DC machinesConstruction, working principle and applications of transformers, induction motor and synchronous machines.

Unit – III: Electrical Power Generation, Transmission and Distribution

Sources of Energy – conventional & non conventional, Introduction and layout of thermal, hydel power plants, Introduction and layout of nuclear power plants, solar power plants, Concepts of power transmission and distribution using single line diagram.

Unit – IV: Electrical Installations & Safety

Components of Switchgear – fuse, MCBs, types of wires & cables, earthing, different types of batteries, Elementary calculations for energy consumption and types of tariffs. Energy Conservation.Electric shock and first aid, Hazardous areas, General principles of electric safety.

Unit – V: Basic Electronic Devices and their applications

Introduction to semi-conductor physics, PN junction diode, Zener diode, Transistor - operation, characteristics and configurations, Operation of transistor as a switch. Half wave, full wave and

bridge rectifier using diodes, types of filters, Zener diode as a voltage regulator, transistor as an amplifier. introduction to feed back amplifiers.

Text Books:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.

2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

3. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA McGrawHill, Second Edition

Data Structures through C

I Year – II Semester

Lecture: 3	Practical: 0	Internal Marks: 30
Credits: 4	Tutorial: 1	External Marks: 70

Prerequisites: Problem Solving Approaches

SYLLABUS:

UNIT - I:

Sortings: Bubble sort, Insertion sort, section sort

Searching: linear search, binary search

UNIT II:

Pointers: Introduction, Pointer Arithmetic and Arrays, Memory Allocations Functions ,Compatibility, Lvalue and Rvalue, Arrays and Pointers, Passing an Array to a Function, , Array of Pointers. Pointers For Inter Function Communications, Pointers to Pointers

UNIT III:

Structures: Structure Type Declaration, Initialization, Accessing Structures, Operations on Structures, Complex Structures, Structures and Functions, Sending the Whole Structure, Passing Structures through Pointers.

Unions: Referencing Unions, Initializers, Unions and Structures, Applications.

Text Input/output: Files, Streams, Standard Library Input/Output Functions, Formatting Input/output Functions and Character Input/Output Functions, Command-Line Arguments.

UNIT IV:

Stacks: Definition, Representing stacks, ADT Stack and its operations: Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms. Recursion, Towers of Hanoi problem.

Queues: Queue and its Sequential Representation, Queue as an abstract data type, Types of Queue: Simple Queue, Circular Queue, Operations on each types of Queues: Algorithms.

UNIT V:

Linked lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; **Doubly linked list:** operations and algorithms.

Circular Linked Lists: all operations their algorithms, Linked representation of Stack and Queue. Polynomials: Addition, Multiplication.

TEXT BOOKS:

 [1]   ReemaThareja, "Computer Fundamentals and C Programming", Oxford, 2012

[2]   Mark Allen Weiss,"Data structure and Algorithm Analysis in C". Addison Wesley Publication.2006.

[3] SEYMOUR LIPSCHUTZ, "Data Structures With C – by Schaum Series".

REFERENCE BOOKS:

[1]   Horowitz Sahni and Anderson-Freed "Fundamentals of Data Structures in C". 2nd Edition, Universities Press,2008.

[2]   Richard F. Gilberg& B. A. Forouzan "Data Structures A Pseudocode Approcah with C", Second Edition, CENGAGELearning.

Data Structures through C Lab
I Year – II Semester

Lecture: 0   Practical: 3   Internal Marks: 40

Credits: 1.5   Tutorial: 0   External Marks: 60

Prerequisites: C Programming

List of Experiments

1. Write C programs to sort the list of elements using followingtechniques
   a. Bubble Sortb. InsertionSortc. SelectionSort
2. Write C programs to search for an element in an array using following techniques
   a. LinearSearchb. BinarySearch
3. Write a C program to demonstrate call by value and call byreference
4. Write a C program to display student information usingstructures
5. Write a C program to count number of lines, words and characters in a file
6. Write a C program to perform stack operations usingarrays
7. Write a C program to perform queue operations usingarrays
8. Write C program to implement stackapplications.
   a. Conversion of Infix expression to postfixexpression
   b. Evaluation of postfixexpression   c. Towers ofHanoi
9. Write a C program to perform circular queue operations usingarrays

10. Write a C program to implement following operations on Single Linked List
    a. Insertion   b. Deletionc. Search
11. Write a C program to implement following operations on DoubleLinked List
 a. Insertion   b. Deletionc.Search
12. Write a C program to implement stack operations using linkedlist
13. Write a C program to implement queue operations using linkedlist
14. Write a C program to add two polynomials using linkedlist
15. Write a C program to multiply two polynomials using linkedlist

PROBABILITY AND STATISTICS

Scheme and Credits: L:3 T:0 P:0 C:3

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)-Centrallimit theorem- t-distribution- Sampling distribution of means (s unknown)- Sampling distribution of variances $-\chi^2$ and F-distributions- Point estimation- Maximum error ofestimate - 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: Curve fitting and Correlation:

Introduction - Fitting a straight line –Second degree curve-exponential curve-power curve by method of least squares-Goodness of fit. Correlation and Regression – Properties.

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:
1. **Shron L. Myers, Keying Ye, Ronald E Walpole,** Probability and Statistics Engineers and the Scientists,8th Edition, Pearson 2007.
2. **William Menden Hall, Robert J. Bever and Barbara Bever**, Introduction toprobability and statistics, Cengage learning, 2009.

ENVIRONMENTAL STUDIES

COURSE OUTCOMES:

1. The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.

2. 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

4. The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.

5. The environmental legislations of India and Social issues and the possible means

6. 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- Grass land eco system ,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 Envirronmental 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
REFERENCE:
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

MANAGEMENT SCIENCE

COURSE OUTCOMES:

1. Defines the basic concepts in the field of management.
2. Discusses the basic importance of Operations Management.
3. Describes about the HRM and role of Marketing.
4. Defines about Project Management & Strategic Management.
5. Describes about the Contemporary Management Practices.

SYLLABUS:

Unit - I

Introduction to Management: Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization - Types of organization structure.

Unit - II

Operations Management: Principles and Types of Management – Work study- Statistical Quality Control-Control charts (P-chart, R-chart, and Cchart). Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

Unit - III

Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions.

Unit - IV

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems). Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

Unit - V

Contemporary Management Practice: Basic concepts of MIS, MRP, Justin- Time (JIT) system, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

Text Books
1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, Management Science' TMH 2011.

Reference Books
1. Koontz & Weihrich: 'Essentials of management' TMH 2011.
2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011.
3. Robbins: Organizational Behaviour, Pearson publications, 2011.
4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011.
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications.
6. Biswajit Patnaik: Human Resource Management, PHI, 2011.
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning

Professional Ethics & Human Values

18MC3T08

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

COURSE OBJECTIVES:

1. To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.
2. To instills Professional Ethics to the student to maintain ethical conduct and discharge their professional duties.
3. To understand the role of Engineers responsibilities towards safety & Work
4. To learn the Engineers' Duties and Rights
5. To understand the various Global Issues

UNIT I: Principles for Harmony

Truthfulness – Customs and Traditions – Value Education – Human Dignity – Human Rights – Fundamental Duties – Aspirations and Harmony (I, We & Nature) – Gender Bias – Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT II: Engineering Ethics and Social Experimentation:

History of Ethics – Need of Engineering Ethics – Senses of Engineering Ethics – Profession and Professionalism – Self Interest – Moral Autonomy – Utilitarianism – Virtue Theory – Uses of Ethical Theories – Deontology – Types of Inquiry – Kohlberg's Theory – Gilligan's Argument – Heinz's Dilemma – Comparison with Standard Experiments – Learning from the Past – Engineers as Mangers – Consultants and Leaders – Balanced Outlook on Law – Role of Codes – Codes and Experimental Nature of Engineering.

UNIT III: Engineers' Responsibilities towards Safety and Risk:

Concept of Safety – Safety and Risk – Types of Risks – Voluntary v/s Involuntary Risk – Consequences – Risk Assessment- Accountability- Liability – Reversible Effects – Threshold Levels of Risk – Delayed v/s Immediate Risk – Safety and the Engineer – Designing for Safety- Risk – Benefit Analysis- Accidents.

UNIT IV: Engineers' Duties and Rights:

Concept of Duty – Professional Duties- Collegiality- Techniques for Achieving Collegiality – Senses of Loyalty- Consensus and Controversy – Professional and Individual Rights –

Confidential and Proprietary Information – Conflict of Interest – Ethical egoism – Collective Bargaining – Confidentiality – Gifts and Bribes – problem solving – Occupational Crimes – Industrial Espionage – Price Fixing – Whistle Blowing.

UNIT V: Global Issues:

Globalization and MNCs – Cross Culture Issues – Business Ethics – Media Ethics- Environmental Ethics – Endangering Lives – Bio Ethics – Computer Ethics – War Ethics – Research Ethics – Intellectual Property Rights.

References:

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi.

2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger – Tata McGraw – Hill – 2003.

3. Professional Ethics and Morals by Prof.A.R.Aryasri, Dharanikota Suyodhana – Maruthi Publications.

4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.

5. Human Values & Professional Ethics by S.B.Gogate, Vikas Publishing House Pvt. Ltd., Noida.

6. Enginnering Ethics & Human Values by M.Govindarajan, S. Natarajan and V.S.Senthil Kumar – PHI Learning Pvt.Ltd – 2009.

7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M.Jayakumaran – University Science Press.

8. Professional Ethics and Human Values by Prof. D.R.Kiran – Tata McGraw – Hill – 2013.

9. Human Values and Professional Ethics by Jayshree Suresh and B.S. Raghavan, S.Chand Publications.

CRYPTOGRAPHY AND NETWORK SECURITY
(Elective)

18MC4T05

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

COURSE OBJECTIVES:

At the end of the course the student is able to understand

- Basics of Information Security
- How to provide security with Symmetric Encryption Methods
- How to provide security with Asymmetric Encryption Methods
- About E-Mail Privacy
- Web Security
- Basic principles of SNMP
- About Firewalls

COURSE OUTCOMES:

1. Be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
2. Be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

UNIT I : Classical Encryption Techniques

Introduction: Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense(Phishing Defensive measures, web based attacks, SQL injection & Defense techniques)(TEXT BOOK 2), Buffer overflow & format string vulnerabilities, TCP session hijacking(ARP attacks, route table modification) UDP hijacking (man-in-the-middle attacks)(TEXT BOOK 3).

UNIT II: Block Ciphers & Symmetric Key Cryptography

Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher Modes of Operations

UNIT III: Number Theory & Asymmetric Key Cryptography

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

Public Key Cryptography: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

UNIT IV: Cryptographic Hash Functions & Digital Signatures, IP Security

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC& CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.

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

UNIT V: User Authentication, Transport Layer Security & Email Security, Intrusion detection systems
User Authentication: Remote user authentication principles, Kerberos
Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH)
Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.
Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS. (TEXT BOOK 2)

TEXT BOOKS:
1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

REFERENCE BOOKS:
1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford
2. Network Security & Cryptography, Bernard Menezes, Cengage, 2010

Distributed Systems

18MC4T06

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

COURSE OUTCOMES:

The student should be made to:
- Understand foundations of Distributed Systems.
- Understand about various issues in Inter-process communication.
- Introduce the idea of peer to peer services and file system.
- Understand in detail the system level and support required for distributed system.
- Understand the issues involved in distributed transactions & concurrency control.

UNIT I

Examples of Distributed Systems–Trends in Distributed Systems, Focus on resource sharing, Challenges, Case study: World Wide Web.
System Models – Physical Model, Architectural Model, Fundamental Model.

UNIT II

Interprocess Communication: Introduction, The API for the Internet Protocols, The Characteristics of Interprocess communication. Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling;
Multicast Communication – IP Multicast, Reliability & ordering of multicast; Network virtualization: Overlay networks – Example.

UNIT III

Peer-to-peer Systems – Introduction, Napster and its legacy, Peer-to-peer, Middleware, Routing overlays, Overlay case studies: Pastry, Tapestry.
Distributed File Systems – Introduction, File service architecture, Network File system, Andrew File system, Enhancements and further developments.

UNIT IV

Distributed Objects and Remote Invocation: Introduction, Communication between Distributed Objects-Object Model, Distributed Object Model; Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVARMI
Operating System Support: Introduction, the Operating System Layer, Protection, Processes and Threads - Address Space, Creation of a New Process, Threads.

UNIT V

Transactions and Concurrency Control– Transactions -Nested transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control, **Distributed Transactions** - Flat and nested distributed transactions, Atomic Commit protocols, Concurrency Control in Distributed

Transactions, Distributed deadlocks, Transaction recovery.

TEXT BOOKS:

1. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems- Concepts and Design", Fourth Edition, Pearson Publication.

2. Ajay D Kshemkalyani, MukeshSighal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge.

EMPLOYABILITY SKILLS: Arithmetic and Logical Reasoning

III Year - II Semester   **Course Code: 18CS6T07**

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

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

SYLLABUS

UNIT-I

Divisibility and remainder rules of numbers, Unit digit, square root, cube root and simplification of numbers, HCF and LCM of numbers, Averages and Percentages Alphabetical and miscellaneous series, Coding and decoding and Blood Relations

UNIT-II

Profit & loss, Simple interest and Compound Interest Direction, Order and Ranking, Sitting arrangement and Puzzle

UNIT-III

Ratio & proportions, Partnership, Alligation and mixtures and Ages**.** Data sufficiency, Inequalities and Decision making.

UNIT-IV

Time and work, Pipes & cisterns and Time and distance. Syllogism, Statement and course of action and Statement and Assumption.

UNIT-V

Boats and streams, Areas, Volume and surface areas. Statement and argument, Cause and effect and Drawing inference.

Note: Students shall be able to solve the problems to the standard of examinations like GRE and CAT TEXT BOOKS:

1) "Objective Arithmetic" by R.S. Agarwal, S. Chand Publications.
2) Verbal and non-verbal Reasoning, R.S. Agarwal, S. Chand Publications

REFERENCES:

1) Quantitative Aptitude by Dinesh Khattar, Pearson Education.
2) .Quantitative Aptitude by Abhjit Guha.
3) Fast Track objective Arithmetic, Rajesh Verma, Arihant publications.

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BIG DATA ANALYTICS

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

TEXT BOOKS:
1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publ.
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

REFERENCE BOOKS:
1. Hadoop in Practice by Alex Holmes, MANNING Publ.
2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne

SOFTWARE LINKS:
1. Hadoop:http://hadoop.apache.org/
2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

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PYTHON PROGRAMMING

UNIT – I:
Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

UNIT – II:
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 – III:
Data Structures Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT – IV:
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 statement, from. Import statement, name spacing,

Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

UNIT – V:
Object Oriented Programming OOP in Python: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Datahiding,

Error and Exceptions: Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions
Brief Tour of the Standard Library - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics

Testing: Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

TEXT BOOKS

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Learning Python, Mark Lutz, Orielly

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

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CYBER SECURITY
ELECTIVE - III

UNIT- I: Introduction to Cybercrime:

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens

UNIT -II: Cyber offenses:

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

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, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

UNIT -IV: Tools and Methods Used in Cybercrime:

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft: Introduction, Phishing, Identity Theft (ID Theft)

UNIT -V: Cybercrimes and Cyber security:

Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program, Continuing Strategies.

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, Sunit Belapure, Wiley.
2. Principles of Information Security, Micheal E.Whitman and Herbert J.Mattord, Cengage Learning.

REFERENCES:

1. Information Security, Mark Rhodes, Ousley, MGH.

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INTERNET OF THINGS

UNIT- I:
The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind Io Ts Sources of the Io Ts, M2M Communication, Examples OF Io Ts, Design Principles For Connected Devices Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

UNIT -II:
Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT- III:
Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT -IV:
Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT- V:
Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology, Sensing the World.

TEXTBOOKS:
1. Internet of Things: Architecture, Design Principles And Applications,Rajkamal, McGraw Hill Higher Education
2. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

REFERNCE BOOKS:
1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
2. Getting Started with the Internet of Things CunoPfister , Oreilly.

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BIG DATA LAB

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

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PYTHON PROGRAMMING LAB

Exercise 1 - Basics
a)   Running instructions in Interactive interpreter and a Python Script
b)   Write a program to purposefully raise Indentation Error and Correct it

Exercise 2 - Operations
a)   Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
b)   Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

Exercise - 3 Control Flow
a) Write a Program for checking whether the given number is a even number or not.
b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10
c) Write a program using a for loop that loops over a sequence. What is sequence ?
d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

Exercise 4 - Control Flow - Continued
a) Find the sum of all the primes below two million.
   Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:
   1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise - 5 - DS
a)   Write a program to count the numbers of characters in the string and store them in a dictionary data structure
b)   Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

Exercise - 6 DS -   Continued
a) Write a program combine_lists that combines these lists into a dictionary.
b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 7 Files
a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 8 Functions

a) Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

Exercise - 9 Functions - Continued

a) Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
b) Write a function dups to find all duplicates in the list.
c) Write a function unique to find all the unique elements of a list.

Exercise - 10 - Functions - Problem Solving

a) Write a function cumulative_product to compute cumulative product of a list of numbers.
b) Write a function reverse to reverse a list. Without using the reverse function.
c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

Exercise 11 - Multi-D Lists

a) Write a program that defines a matrix and prints
b) Write a program to perform addition of two square matrices
c) Write a program to perform multiplication of two square matrices
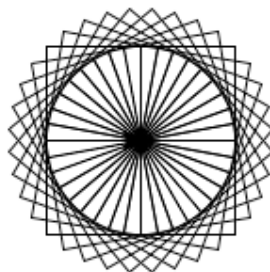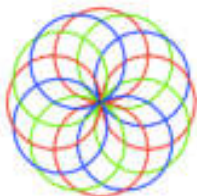
Exercise - 12 - Modules

a)   Install packages requests, flask and explore them. using (pip)
b)   Write a script that imports requests and fetch content from the page. Eg. (Wiki)
c)   Write a simple script that serves a simple HTTPResponse and a simple HTML Page

Exercise - 13 OOP

a) Class variables and instance variable and illustration of the self variable
i) Robot
  ii) ATM Machine

Exercise - 14 GUI, Graphics

1. Write a GUI for an Expression Calculator using tk
2. Write a program to implement the following figures using turtle

Exercise - 15 - Testing
a) Write a test-case to check the function even _numbers which return True on passing a list of all even numbers
b) Write a test-case to check the function reverse _string which returns the reversed string

Exercise - 16 - Advanced
a)   Build any one classical data structure.
b)   Write a program to solve knapsack problem.