R18 B.TECH II YEAR LABS SYLLABUS

R18 B.TECH CIVIL ENGINEERING
SURVEYING LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Pre-Requisites: Surveying Theory

Course Objectives:

- To impart the practical knowledge in the field- measuring distances, directions, angles,
- To determining R.L.'s areas and volumes
- To set out Curves
- To stake out points
- To traverse the area
- To draw Plans and Maps

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

- Apply the principle of surveying for civil Engineering Applications
- Calculation of areas, Drawing plans and contour maps using different measuring equipment at field level
- Write a technical laboratory report

List of Experiments

1. Surveying of an area by chain, and compass survey (closed traverse) & plotting.
2. Determine of distance between two inaccessible points with compass
3. Radiation method, intersection methods by plane table survey.
4. Levelling – Longitudinal and cross-section and plotting
5. Measurement of Horizontal and vertical angle by theodolite
6. Trigonometric leveling using theodolite
7. Height and distances using principles of tachometric surveying
8. Determination of height, remote elevation, distance between inaccessible points using total station
9. Determination of Area using total station and drawing map
10. Traversing using total station for drawing contour map
11. Stake out using total station
12. Setting out Curve using total station

R18 B.TECH CIVIL ENGINEERING
STRENGTH OF MATERIALS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Course Objectives:

- Make measurements of different strains, stress and elastic properties of materials used in Civil Engineering.
- Provide physical observations to complement concepts learnt
- Introduce experimental procedures and common measurement instruments, equipment, devices.
- Exposure to a variety of established material testing procedures and techniques
- Different methods of evaluation and inferences drawn from observations

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

- Configure & Operate a data acquisition system using various testing machines of solid materials
- Compute and Analyze engineering values (e.g. stress or strain) from laboratory measurements.
- Write a technical laboratory report

List of Experiments:

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test.

R18 B.TECH CIVIL ENGINEERING
ENGINEERING GEOLOGY LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-Requisites: Engineering Geology Theory

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

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

- Understands the method and ways of investigations required for Civil Engg projects
- Identify the various rocks, minerals depending on geological classifications
- Will able to learn to couple geologic expertise with the engineering properties of rock and unconsolidated materials in the characterization of geologic sites for civil work projects and the quantification of processes such as rock slides and settlement.
- Write a technical laboratory report

List of Experiments

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
5. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
7. Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
8. Study of topographical features from Geological maps. Identification of symbols in maps.
9. Simple structural Geology Problems (Folds, Faults & Unconformities)

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.
5. Microscopic identification of rocks.

R18 B.TECH CIVIL ENGINEERING
COMPUTER AIDED CIVIL ENGINEERING DRAWING

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

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

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

- Use the Autocad commands for drawing 2D & 3D building drawings required for different civil engg applications.
- Plan and draw Civil Engineering Buildings as per aspect and orientation.
- Presenting drawings as per user requirements and preparation of technical report

List of Experiments

1. Introduction to computer aided drafting and different coordinate system
2. Drawing of Regular shapes using Editor mode
3. Introduction GUI and drawing of regular shapes using GUI
4. Exercise on Draw tools
5. Exercise on Modify tools
6. Exercise on other tools (Layers, dimensions, texting etc.)
7. Drawing of building components like walls, lintels, Doors, and Windows. using CAD software
8. Drawing a plan of Building and dimensioning
9. Drawing a plan of a residential building using layers
10. Developing a 3-D plan from a given 2-D plan
11. Developing sections and elevations for given
    a) Single storied buildings b) multi storied buildings
12. Auto CAD applications in surveying, mechanics etc.

TEXT BOOKS:

1. Computer Aided Design Laboratory by M. N. Sesha Praksh & Dr. G. S. Servesh – Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.

R18 B.TECH CIVIL ENGINEERING
HYDRAULICS & HYDRAULIC MACHINERY LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Course Objectives

- To **identify** the behavior of analytical models introduced in lecture to the actual behavior of real fluid flows.
- To **explain** the standard measurement techniques of fluid mechanics and their applications.
- To **illustrate** the students with the components and working principles of the Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- To **analyze** the laboratory measurements and to document the results in an appropriate format.

Course Outcomes: Students who successfully complete this course will have demonstrated ability to:

- **Describe** the basic measurement techniques of fluid mechanics and its appropriate application.
- **Interpre**t the results obtained in the laboratory for various experiments.
- **Discover** the practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- **Compare** the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.
- Write a technical laboratory report

List of Experiments

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method
3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Determination of Energy loss in Hydraulic jump
8. Determination of Manning's and Chezy's constants for Open channel flow.
9. Impact of jet on vanes
10. Performance Characteristics of Pelton wheel turbine
11. Performance Characteristics of Francis turbine
12. Performance characteristics of Keplan Turbine
13. Performance Characteristics of a single stage / multi stage Centrifugal Pump

R18 B.TECH CIVIL ENGINEERING
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-requisites: Basic Electrical and Electronics Engineering

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

List of experiments/demonstrations:

PART A: ELECTRICAL

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   (ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART B: ELECTRONICS

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCES:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

R18 B.TECH MECHANICAL ENGINEERING
PRODUCTION TECHNOLOGY LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-requisites: Production Technology

Course Objectives:

- Know about the basic Physical, Chemical Properties of materials
- Explain why some material(s) are better to be used in a product for given design requirements
- Learn the basic operation of various manufacturing processes
- Learn how various products are made using traditional, non-traditional, or Electronics manufacturing processes
- Design simple process plans for parts and products
- Understand how process conditions are set for optimization of production
- Learn how CNC machines work
- Write and execute CNC machining programs to cut parts on a milling machine
- Measure a given manufactured part to evaluate its size, tolerances and surface finish
- Design and fabricate a simple product

Course Outcomes: Understanding the properties of moulding sands and pattern making. Fabricate joints using gas welding and arc welding. Evaluate the quality of welded joints. Basic idea of press working tools and performs moulding studies on plastics.

Minimum of 12 Exercises need to be performed

I. Metal Casting Lab:

1. Pattern Design and making - for one casting drawing.
2. Sand properties testing - Exercise -for strengths, and permeability – 1
3. Moulding Melting and Casting - 1 Exercise

II. Welding Lab:

1. ARC Welding Lap & Butt Joint - 2 Exercises
2. Spot Welding - 1 Exercise
3. TIG Welding - 1 Exercise
4. Plasma welding and Brazing - 2 Exercises
   (Water Plasma Device)

III. Mechanical Press Working:

1. Blanking & Piercing operation and study of simple, compound and progressive press tool.
2. Hydraulic Press: Deep drawing and extrusion operation.
3. Bending and other operations

IV. Processing Of Plastics

1. Injection Moulding
2. Blow Moulding

REFERENCE BOOK:

1. Dictionary of Mechanical Engineering – G.H.F. Nayler, Jaico Publishing House.

R18 B.TECH MECHANICAL ENGINEERING
MACHINE DRAWING PRACTICE

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-requisites: Engineering graphics

Course objectives: To familiarize with the standard conventions for different materials and machine parts in working drawings. To make part drawings including sectional views for various machine elements. To prepare assembly drawings given the details of part drawings.

Course Outcomes:

- Preparation of engineering and working drawings with dimensions and bill of material during design and development. Developing assembly drawings using part drawings of machine components.
- Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.
- Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.
- Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.
- Title boxes, their size, location and details - common abbreviations and their liberal usage
- Types of Drawings – working drawings for machine parts.

Drawing of Machine Elements and simple parts

Selection of Views, additional views for the following machine elements and parts with every drawing proportion.

1. Popular forms of Screw threads, bolts, nuts, stud bolts, tap bolts, set screws.
2. Keys, cottered joints and knuckle joint.
3. Rivetted joints for plates
4. Shaft coupling, spigot and socket pipe joint.
5. Journal, pivot and collar and foot step bearings.

Assembly Drawings:

Drawings of assembled views for the part drawings of the following using conventions and easy drawing proportions.

1. Steam engine parts – stuffing boxes, cross heads, Eccentrics.
2. Machine tool parts: Tail stock, Tool Post, Machine Vices.
3. Other machine parts - Screws jacks, Petrol engine connecting rod, Plummer block, Fuel Injector
4. Valves - Steam stop valve, spring loaded safety valve, feed check valve and air cock.

NOTE: First angle projection to be adopted. The student should be able to provide working drawings of actual parts.

TEXT BOOKS:

1. Machine Drawing / N.D. Bhatt / Charotar
2. Machine Drawing with Auto CAD / Goutham Pohit, Goutam Ghosh / Pearson

REFERENCE BOOKS:

1. Machine Drawing by / Bhattacharyya / Oxford
2. Machine Drawing / Ajeet Singh / Mc Graw Hill

R18 B.TECH MECHANICAL ENGINEERING
MATERIAL SCIENCE & MECHANICS OF SOLIDS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

MATERIAL SCIENCE:

Course Objective: The purpose of this course is to make the students learn the concepts of Metallurgy and Material Science role in all manufacturing processes which convert raw materials into useful products adapted to human needs.

Course Outcomes: The Primary focus of the Metallurgy and Material science program is to provide undergraduates with a fundamental knowledge based associated materials properties, and their selection and application. Upon graduation, students would have acquired and developed the necessary background and skills for successful careers in the materials-related industries. Furthermore, after completing the program, the student should be well prepared for management positions in industry or continued education toward a graduate degree.

List of Experiments:

1. Preparation and study of crystal models for simple cubic, body centred cubic, face centred cubic and hexagonal close packed structures.
2. Preparation and study of the Microstructure of pure metals like Iron, Cu and Al.
3. Grain size measurement by different methods.
4. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
5. Study of the Microstructures of Cast Irons.
6. Study of Microstructures of different alloy steels.
7. Study of the Microstructures of Non-Ferrous alloys.
8. Study of the Microstructures of Heat treated steels.
9. Hardenability of steels by Jominy End Quench Test.
10. To find out the hardness of various heat treated and untreated plain carbon steels.

MECHANICS OF SOLIDS:

Course Objectives: The objective is to learn the fundamental concepts of stress, strain, and deformation of solids with applications to bars, beams, and columns. Detailed study of engineering properties of materials is also of interest. Fundamentals of applying equilibrium, compatibility, and force-deformation relationships to structural elements are emphasized. The students are introduced to advanced concepts of flexibility and stiffness method of structural analysis. The course builds on the fundamental concepts of engineering mechanics course.

The students will advance the students' development of the following broad capabilities:

- Students will be able to understand basic concepts of stress, strain and their relations based on linear elasticity. Material behaviors due to different types of loading will be discussed.

- Students will be able to understand and know how to calculate stresses and deformation of a bar due to an axial loading under uniform and non-uniform conditions.
- Students will understand how to develop shear-moment diagrams of a beam and find the maximum moment/shear and their locations
- Students will understand how to calculate normal and shear stresses on any cross-section of a beam. Different cross-sections (including I-beam) will be discussed and applied Continuous Assessment Test 10 marks Mid Semester Test 15 marks End

Course Outcomes

- Analyze the behavior of the solid bodies subjected to various types of loading.
- Apply knowledge of materials and structural elements to the analysis of simple structures.
- Undertake problem identification, formulation and solution using a range of analytical methods
- Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.
- Expectation and capacity to undertake lifelong learning.

Any 10 experiments from the following

1. Direct tension test
2. Bending test on Simple supported beam
2. 3 Bending test on Cantilever beam
3. Torsion test
4. Brinell hardness test
5. Rockwell hardness test
6. Test on springs
7. Compression test on cube
8. Izod Impact test
9. Charpy Impact test
10. Punch shear test

R18 B.TECH MECHANICAL ENGINEERING
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-requisites: Basic Electrical and Electronics Engineering

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

List of experiments/demonstrations:

PART A: ELECTRICAL

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   (ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART B: ELECTRONICS

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCES:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

R18 B.TECH MECHANICAL ENGINEERING
FLUID MECHANICS AND HYDRAULIC MACHINES LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Course Objectives:

- To understand the basic principles of fluid mechanics.
- To identify various types of flows.
- To understand boundary layer concepts and flow through pipes.
- To evaluate the performance of hydraulic turbines.
- To understand the functioning and characteristic curves of pumps.

Course Outcomes:

- Able to explain the effect of fluid properties on a flow system.
- Able to identify type of fluid flow patterns and describe continuity equation.
- To analyze a variety of practical fluid flow and measuring devices and utilize fluid mechanics principles in design.
- To select and analyze an appropriate turbine with reference to given situation in power plants.
- To estimate performance parameters of a given Centrifugal and Reciprocating pump.
- Able to demonstrate boundary layer concepts

List of Experiments:

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Verification of Bernoulli's Theorems.

R18 B.TECH MECHANICAL ENGINEERING
INSTRUMENTATION AND CONTROL SYSTEMS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-requisites: Basic principles of Instrumentation and control systems

Course Outcomes: At the end of the course, the student will be able to Characterize and calibrate measuring devices. Identify and analyze errors in measurement. Analyze measured data using regression analysis. Calibration of Pressure Gauges, temperature, LVDT, capacitive transducer, rotameter.

LIST OF EXPERIMENTS:

1. Calibration of Pressure Gauges.
2. Calibration of transducer for temperature measurement.
3. Study and calibration of LVDT transducer for displacement measurement.
4. Calibration of strain gauge for temperature measurement.
5. Calibration of thermocouple for temperature measurement.
6. Calibration of capacitive transducer for angular displacement.
7. Study and calibration of photo and magnetic speed pickups for the measurement of speed.
8. Calibration of resistance temperature detector for temperature measurement.
9. Study and calibration of a rotameter for flow measurement.
10. Study and use of a Seismic pickup for the measurement of vibration amplitude of an engine bed at various loads.
11. Study and calibration of McLeod gauge for low pressure.
12. Measurement and control of Pressure of a process using SCADA system.
13. Measurement and control of level in a tank using capacitive transducer with SCADA.
14. Measurement and control of temperature of a process using resistance temperature detector with SCADA.

R18 B.TECH ELECTRICAL AND ELECTRONICS ENGINEERING
ELECTRICAL MACHINES LAB – I

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisite: Electrical Machines-I

Course Objectives:

- To expose the students to the operation of DC Generator
- To expose the students to the operation of DC Motor.
- To examine the self-excitation in DC generators.

Course Outcomes: After completion of this lab the student is able to

- Start and control the Different DC Machines.
- Assess the performance of different machines using different testing methods
- Identify different conditions required to be satisfied for self - excitation of DC Generators.
- Separate iron losses of DC machines into different components

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator (Determination of critical field resistance and critical speed)
2. Load test on DC shunt generator (Determination of characteristics)
3. Load test on DC series generator (Determination of characteristics)
4. Load test on DC compound generator (Determination of characteristics.
5. Hopkinson's test on DC shunt machines (Predetermination of efficiency)
6. Fields test on DC series machines (Determination of efficiency)
7. Swinburne's test and speed control of DC shunt motor (Predetermination of efficiencies)
8. Brake test on DC compound motor (Determination of performance curves)

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted:

9. Brake test on DC shunt motor (Determination of performance curves)
10. Retardation test on DC shunt motor (Determination of losses at rated speed)
11. Separation of losses in DC shunt motor.

TEXT BOOKS:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
2. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.

REFERENCES:

1. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
2. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
3. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

R18 B.TECH ELECTRICAL AND ELECTRONICS ENGINEERING
ANALOG ELECTRONICS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisite: Analog Electronics

Course Objectives:

- To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
- Learn the concepts of high frequency analysis of transistors.
- To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
- To introduce the basic building blocks of linear integrated circuits.
- To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Know the characteristics, utilization of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits.

List of Experiments

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with & without filters
3. Common Emitter Amplifier Characteristics
4. Common Base Amplifier Characteristics
5. Common Source amplifier Characteristics
6. Measurement of h-parameters of transistor in CB, CE, CC configurations
7. Inverting and Non-inverting Amplifiers using Op Amps.
8. Adder and Subtractor using Op Amp.
9. Integrator Circuit using IC 741.
10. Differentiator circuit using Op Amp.
11. Current Shunt Feedback amplifier
12. RC Phase shift Oscillator
13. Hartley and Colpitt's Oscillators
14. Class A power amplifier

R18 B.TECH ELECTRICAL AND ELECTRONICS ENGINEERING
ELECTRICAL CIRCUITS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisite: Basic Electrical Engineering, Electrical Circuit Analysis

Course Objectives:

- To design electrical systems
- To analyze a given network by applying various Network Theorems
- To measure three phase Active and Reactive power.
- To understand the locus diagrams

Course Outcomes: After Completion of this lab the student is able to

- Analyze complex DC and AC linear circuits
- Apply concepts of electrical circuits across engineering
- Evaluate response in a given network by using theorems

The following experiments are required to be conducted as compulsory experiments

1. Verification of Thevenin's and Norton's Theorems
2. Verification of Superposition, Reciprocity and Maximum Power Transfer theorems
3. Locus Diagrams of RL and RC Series Circuits
4. Series and Parallel Resonance
5. Time response of first order RC / RL network for periodic non – sinusoidal inputs – Time constant and Steady state error determination.
6. Two port network parameters – Z – Y parameters, Analytical verification.
7. Two port network parameters – A, B, C, D & Hybrid parameters, Analytical verification
8. Separation of Self and Mutual inductance in a Coupled Circuit. Determination of Co-efficient of Coupling.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted

9. Verification of compensation & Milliman's theorems
10. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequency spectrum.
11. Determination of form factor for non-sinusoidal waveform
12. Measurement of Active Power for Star and Delta connected balanced loads
13. Measurement of Reactive Power for Star and Delta connected balanced loads

TEXT BOOKS:

1. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
2. D. Roy Choudhury, "Networks and Systems", New Age International Publications, 1998.

REFERENCES:

1. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013.
2. C. K. Alexander and M. N. O. Sadiku, "Electric Circuits", McGraw Hill Education, 2004.

K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.

R18 B.TECH ELECTRICAL AND ELECTRONICS ENGINEERING
DIGITAL ELECTRONICS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisite: Digital Electronics, Analog Electronics

Course Objectives:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

Course Outcomes: At the end of this course, students will demonstrate the ability to

- Understand working of logic families and logic gates.
- Design and implement Combinational and Sequential logic circuits.
- Understand the process of Analog to Digital conversion and Digital to Analog conversion.
- Be able to use PLDs to implement the given logical problem.

List of Experiments:

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
6. Design and realization of a 4-bit pseudo random sequence generator using logic gates.
7. Design and realization of an 8-bit parallel load and serial out shift register using flip-flops.
8. Design and realization a Synchronous and Asynchronous counter using flip-flops
9. Design and realization of Asynchronous counters using flip-flops
10. Design and realization 8x1 using 2x1 mux
11. Design and realization 2-bit comparator
12. Verification of truth tables and excitation tables
13. Realization of logic gates using DTL, TTL, ECL, etc.,
14. State machines

TEXT BOOKS:

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

REFERENCES:

1. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

R18 B.TECH ELECTRICAL AND ELECTRONICS ENGINEERING
ELECTRICAL MACHINES LAB - II

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisite: Electrical Machines – I & Electrical Machines - II

Course Objectives:

- To understand the operation of synchronous machines
- To understand the analysis of power angle curve of a synchronous machine
- To understand the equivalent circuit of a single phase transformer and single phase induction motor
- To understand the circle diagram of an induction motor by conducting a blocked rotor test.

Course Outcomes: After the completion of this laboratory course, the student will be able

- Assess the performance of different machines using different testing methods
- To convert the Phase from three phase to two phase and vice versa
- Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods
- Control the active and reactive power flows in synchronous machines
- Start different machines and control the speed and power factor

The following experiments are required to be conducted as compulsory experiments

1. O.C. & S.C. Tests on Single phase Transformer
2. Sumpner's test on a pair of single phase transformers
3. No-load & Blocked rotor tests on three phase Induction motor
4. Regulation of a three –phase alternator by synchronous impedance &m.m.f. methods
5. V and Inverted V curves of a three—phase synchronous motor.
6. Equivalent Circuit of a single phase induction motor
7. Determination of Xd and Xq of a salient pole synchronous machine
8. Load test on three phase Induction Motor

In addition to the above experiments, at least any two of the following experiments are required to be conducted from the following list

1. Separation of core losses of a single phase transformer
2. Efficiency of a three-phase alternator
3. Parallel operation of Single phase Transformers
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
5. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers
6. Measurement of sequence impedance of a three-phase alternator.
7. Vector grouping of Three Transformer
8. Scott Connection of transformer

TEXT BOOKS:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.

REFERENCES:

1. P. S. Bimbhra, “Electrical Machinery”, Khanna Publishers, 2011.
2. I. J. Nagrath and D. P. Kothari, “Electric Machines”, McGraw Hill Education, 2010.
3. A. S. Langsdorf, “Alternating current machines”, McGraw Hill Education, 1984.
4. P. C. Sen, “Principles of Electric Machines and Power Electronics”, John Wiley & Sons, 2007.

R18 B.TECH ELECTRICAL AND ELECTRONICS ENGINEERING
CONTROL SYSTEMS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisite: Control Systems

Course Objectives:

- To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
- To assess the system performance using time domain analysis and methods for improving it
- To assess the system performance using frequency domain analysis and techniques for improving the performance
- To design various controllers and compensators to improve system performance

Course Outcomes: After completion of this lab the student is able to

- How to improve the system performance by selecting a suitable controller and/or a compensator for a specific application
- Apply various time domain and frequency domain techniques to assess the system performance
- Apply various control strategies to different applications(example: Power systems, electrical drives etc)
- Test system controllability and observability using state space representation and applications of state space representation to various systems

The following experiments are required to be conducted compulsory experiments:

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions, and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC motor
6. Transfer function of DC generator
7. Temperature controller using PID
8. Characteristics of AC servo motor

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted

1. Effect of P, PD, PI, PID Controller on a second order systems
2. Lag and lead compensation – Magnitude and phase plot
3. (a) Simulation of P, PI, PID Controller.
4. (b) Linear system analysis (Time domain analysis, Error analysis) using suitable software

5. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using suitable software
6. State space model for classical transfer function using suitable software -Verification.
7. Design of Lead-Lag compensator for the given system and with specification using suitable software

TEXT BOOKS:

1. M. Gopal, “Control Systems: Principles and Design”, McGraw Hill Education, 1997.
2. B. C. Kuo, “Automatic Control System”, Prentice Hall, 1995.

REFERENCES:

1. K. Ogata, “Modern Control Engineering”, Prentice Hall, 1991.
2. I. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International, 2009.

R18 B.TECH COMPUTER SCIENCE AND ENGINEERING
ANALOG AND DIGITAL ELECTRONICS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Course Objectives

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To give understanding of various types of amplifier circuits
4. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
5. To understand the concepts of combinational logic circuits and sequential circuits.

Course Outcomes: Upon completion of the Course, the students will be able to:

1. Know the characteristics of various components.
2. Understand the utilization of components.
3. Design and analyze small signal amplifier circuits.
4. Postulates of Boolean algebra and to minimize combinational functions
5. Design and analyze combinational and sequential circuits
6. Known about the logic families and realization of logic gates.

LIST OF EXPERIMENTS

1. Full Wave Rectifier with & without filters
2. Common Emitter Amplifier Characteristics
3. Common Base Amplifier Characteristics
4. Common Source amplifier Characteristics
5. Measurement of h-parameters of transistor in CB, CE, CC configurations
6. Input and Output characteristics of FET in CS configuration
7. Realization of Boolean Expressions using Gates
8. Design and realization logic gates using universal gates
9. generation of clock using NAND / NOR gates
10. Design a 4 – bit Adder / Subtractor
11. Design and realization a Synchronous and Asynchronous counter using flip-flops
12. Realization of logic gates using DTL, TTL, ECL, etc.

R18 B.TECH COMPUTER SCIENCE AND ENGINEERING
DATA STRUCTURES LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Prerequisites

1. Course on “Programming for problem solving”.

Course Objectives

2. It covers various concepts of C programming language
3. It introduces searching and sorting algorithms
4. It provides an understanding of data structures such as stacks and queues.

Course Outcomes

1. Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
2. Ability to Implement searching and sorting algorithms

LIST OF EXPERIMENTS

1. Write a program that uses functions to perform the following operations on singly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort ii) Selection sort iii) Insertion sort
7. Write a program that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i) Linear search ii) Binary search
8. Write a program to implement the tree traversal methods.
9. Write a program to implement the graph traversal methods.

TEXTBOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, *PHI/Pearson Education*.

REFERENCE:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage *Learning*.

R18 B.TECH COMPUTER SCIENCE AND ENGINEERING
IT WORKSHOP LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Course Objectives:
The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible. Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks would be introduced. **Productivity tools** module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

PC Hardware
Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Task 6: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Internet & World Wide Web

Task1: **Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

LaTeX and MS/equivalent (FOSS) tool Power Point

Task1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Task 2: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*
3. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education.*
4. PC Hardware - A Handbook – Kate J. Chase *PHI* (Microsoft)
5. LaTeX Companion – Leslie Lamport, *PHI/Pearson*.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – *CISCO Press, Pearson Education*.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press , *Pearson Education.*

R18 B.TECH COMPUTER SCIENCE AND ENGINEERING
C++ PROGRAMMING LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisites

1. A course on "Programming for Problem Solving"

Course Objectives

1. Introduces object-oriented programming concepts using the C++ language.
2. Introduces the principles of data abstraction, inheritance and polymorphism;
3. Introduces the principles of virtual functions and polymorphism
4. Introduces handling formatted I/O and unformatted I/O
5. Introduces exception handling

Course Outcomes

1. Ability to develop applications for a range of problems using object-oriented programming techniques

LIST OF EXPERIMENTS

1. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.

2. Write a C++ program to declare Struct. Initialize and display contents of member variables.

3. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

4. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.
5. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary)**.**

6. Write a C++ to illustrate the concepts of console I/O operations.

7. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.

8. Write a C++ program to allocate memory using new operator.

9. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)

10. Write a C++ program to create an array of pointers. Invoke functions using array objects.

11. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.

R18 B.TECH COMPUTER SCIENCE AND ENGINEERING

OPERATING SYSTEMS LAB

(Using UNIX/LINUX)

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Prerequisites

1. A course on "Programming for Problem Solving"
2. A course on "Computer Organization and Architecture"

Co-requisite: A course on "Operating Systems".

Course Objectives

1. To provide an understanding of the design aspects of operating system concepts through simulation
2. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes

1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to implement C programs using Unix system calls

LIST OF EXPERIMENTS

1. Write C programs to simulate the following CPU Scheduling algorithms
   a) FCFS b) SJF c) Round Robin d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
   a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques
   a) Paging b) Segmentation

TEXT BOOKS

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, *Pearson* education.

REFERENCE BOOKS

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, *Pearson Education/PHI*
2. Operating System - A Design Approach-Crowley, *TMH*.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, *Pearson/PHI*
4. UNIX Programming Environment, Kernighan and Pike, *PHI/Pearson Education*
5. UNIX Internals: The New Frontiers, U. Vahalia, *Pearson Education*

R18 B.TECH COMPUTER SCIENCE AND ENGINEERING
DATABASE MANAGEMENT SYSTEMS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Co-requisites

1. Co-requisite of course “Database Management Systems”

Objectives

1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation

Outcomes

1. Design database schema for a given application and apply normalization
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers

LIST OF EXPERIMENTS

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata Mc Graw Hill,* 3rd Edition
2. Database System Concepts, Silberschatz, Korth, *Mc GrawHill*, V edition.

REFERENCES:

1. Database 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*
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, *SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student Edition.*

R18 B.TECH COMPUTER SCIENCE AND ENGINEERING
JAVA PROGRAMMING LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Objectives:

1. To write programs using abstract classes.
2. To write programs for solving real world problems using java collection frame work.
3. To write multithreaded programs.
4. To write GUI programs using swing controls in Java.
5. To introduce java compiler and eclipse platform.
6. To impart hands on experience with java programming.

Outcomes:

1. Able to write programs for solving real world problems using java collection frame work.
2. Able to write programs using abstract classes.
3. Able to write multithreaded programs.
4. Able to write GUI programs using swing controls in Java.

Note:

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use of Eclipse platform.
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

LIST OF EXPERIMENTS

1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

3. **a)** Develop an applet in Java that displays a simple message.
   b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.

4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread

computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

6. Write a Java program for the following:
   Create a doubly linked list of elements.
   Delete a given element from the above list.
   Display the contents of the list after deletion.

7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “Stop” or “Ready” or “Go” should appear above the buttons in selected color. Initially, there is no message shown.

8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.

10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

12. Write a Java program that correctly implements the producer – consumer problem using the concept of interthread communication.

13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order

15. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.

REFERENCE BOOKS

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition *Pearson* education.
2. Thinking in Java, Bruce Eckel, *Pearson* Education.
3. Java Programming, D. S. Malik and P. S. Nair, *Cengage* Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, *Pearson*.

R18 B.TECH INFORMATION TECHNOLOGY
ANALOG AND DIGITAL ELECTRONICS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Course Objectives

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To give understanding of various types of amplifier circuits
4. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
5. To understand the concepts of combinational logic circuits and sequential circuits.

Course Outcomes: Upon completion of the Course, the students will be able to:

1. Know the characteristics of various components.
2. Understand the utilization of components.
3. Design and analyze small signal amplifier circuits.
4. Postulates of Boolean algebra and to minimize combinational functions
5. Design and analyze combinational and sequential circuits
6. Known about the logic families and realization of logic gates.

LIST OF EXPERIMENTS

1. Full Wave Rectifier with & without filters
2. Common Emitter Amplifier Characteristics
3. Common Base Amplifier Characteristics
4. Common Source amplifier Characteristics
5. Measurement of h-parameters of transistor in CB, CE, CC configurations
6. Input and Output characteristics of FET in CS configuration
7. Realization of Boolean Expressions using Gates
8. Design and realization logic gates using universal gates
9. generation of clock using NAND / NOR gates
10. Design a 4 – bit Adder / Subtractor
11. Design and realization a Synchronous and Asynchronous counter using flip-flops
12. Realization of logic gates using DTL, TTL, ECL, etc.

R18 B.TECH INFORMATION TECHNOLOGY
DATA STRUCTURES LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Prerequisites

1. Course on "Programming for problem solving"

Course Objectives

1. It covers various concepts of C programming language
2. It introduces searching and sorting algorithms
3. It provides an understanding of data structures such as stacks and queues.

Course Outcomes

1. Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
2. Ability to Implement searching and sorting algorithms

LIST OF EXPERIMENTS

1. Write a program that uses functions to perform the following operations on singly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) Pointers
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) Pointers
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Bubble sort ii) Selection sort iii) Insertion sort
7. Write a program that use both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i) Linear search ii) Binary search
8. Write a program to implement the tree traversal methods.
9. Write a program to implement the graph traversal methods.

TEXTBOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, *Universities Press*.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, *PHI/Pearson Education*.

REFERENCE:

2. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage *Learning*.

R18 B.TECH INFORMATION TECHNOLOGY
IT WORKSHOP AND MICROPROCESSOR LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Course Objectives:
The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, Power Point and Publisher.

PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers. In addition, hardware and software level troubleshooting process, tips and tricks would be covered. **The students should work on working PC to disassemble and assemble to working condition and install Windows and Linux on the same PC. Students are suggested to work similar tasks in the Laptop scenario wherever possible. Internet & World Wide Web** module introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet. Usage of web browsers, email, newsgroups and discussion forums would be covered. In addition, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber-attacks would be introduced. **Productivity tools** module would enable the students in crafting professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools and LaTeX.

PC Hardware
Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Hardware Troubleshooting: Students have to be given a PC which does not boot due to improper assembly or defective peripherals. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Task 6: Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition. The work done should be verified by the instructor and followed up with a Viva.

Internet & World Wide Web

Task1: **Orientation & Connectivity Boot Camp:** Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: **Search Engines & Netiquette:** Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to first install an antivirus software, configure their personal firewall and windows update on their computer. Then they need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office 2007/ equivalent (FOSS) tool word: Importance of LaTeX and MS office 2007/ equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4 : Creating a Newsletter : Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office 2007/ equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Performance Analysis - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

LaTeX and MS/equivalent (FOSS) tool Power Point

Task1: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in both LaTeX and Powerpoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

Task 2: Second week helps students in making their presentations interactive. Topic covered during this week includes: Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Concentrating on the in and out of Microsoft power point and presentations in LaTeX. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, *WILEY Dreamtech*
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, *WILEY Dreamtech*
3. Introduction to Information Technology, ITL Education Solutions limited, *Pearson Education.*
4. PC Hardware - A Handbook – Kate J. Chase *PHI* (Microsoft)
5. LaTeX Companion – Leslie Lamport, *PHI/Pearson*.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – *CISCO Press, Pearson Education*.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press , *Pearson Education.*

MICROPROCESSOR LAB

Write assembly language programs for the following using MASAM.

1. Write assembly language programs to evaluate the expressions:

i) a = b + c –d * e

ii) z = x * y + w – v +u / k

a. Considering 8-bit, 16 bit and 32-bit binary numbers as b, c, d, e.

b. Considering 2-digit, 4 digit and 8-digit BCD numbers.

Take the input in consecutive memory locations and results also Display the results by using "int xx" of 8086. Validate program for the boundary conditions.

2. Write an ALP of 8086 to take N numbers as input. And do the following operations on them.

a. Arrange in ascending and descending order.

3. Find max and minimum

a. Find average

Considering 8-bit, 16-bit binary numbers and 2-digit, 4 digit and 8-digit BCD numbers. Display the results by using "int xx" of 8086. Validate program for the boundary conditions.

4. Write an ALP of 8086 to take a string of as input (in 'C' format) and do the following Operations on it.

a. Find the length

b. Find it is Palindrome or n

5. Find whether given string substring or not.

a. Reverse a string

b. Concatenate by taking another sting

Display the results by using "int xx" of 8086.

6. Write the ALP to implement the above operations as procedures and call from the main procedure.

7. Write an ALP of 8086 to find the factorial of a given number as a Procedure and call from the main program which display the result.

Text Books:

1. Switching theory and logic design –A. Anand Kumar PHI, 2013

2. Advanced microprocessor & Pieperar-A. K. Ray and K. M. Bherchandavi, TMH, 2nd edition.

References:

1. Switching and Finite Automatic theory-Zvi Kohavi, Niraj K.Jha Cambridge ,3rd edition

2. Digital Design –Morris Mano, PHI, 3rd edition

3. Microprocessor and Interfacing –Douglas V. Hall, TMGH 2nd edition.

R18 B.TECH INFORMATION TECHNOLOGY
C++ PROGRAMMING LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisites

1. A course on "Programming for Problem Solving"

Course Objectives

1. Introduces object-oriented programming concepts using the C++ language.
2. Introduces the principles of data abstraction, inheritance and polymorphism;
3. Introduces the principles of virtual functions and polymorphism
4. Introduces handling formatted I/O and unformatted I/O
5. Introduces exception handling

Course Outcomes

1. Ability to develop applications for a range of problems using object-oriented programming techniques

LIST OF EXPERIMENTS

1. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.

2. Write a C++ program to declare Struct. Initialize and display contents of member variables.

3. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.

4. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members.

5. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary).

6. Write a C++ to illustrate the concepts of console I/O operations.

7. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.

8. Write a C++ program to allocate memory using new operator.

9. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)

10. Write a C++ program to create an array of pointers. Invoke functions using array objects.

11. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.

R18 B.TECH INFORMATION TECHNOLOGY
OPERATING SYSTEMS LAB
(Using UNIX/LINUX)

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Prerequisites

1. A course on "Programming for Problem Solving"
2. A course on "Computer Organization and Architecture"

Co-requisite: A course on "Operating Systems".

Course Objectives

1. To provide an understanding of the design aspects of operating system concepts through simulation
2. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix

Course Outcomes

1. Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.
2. Able to implement C programs using Unix system calls

LIST OF EXPERIMENTS

1. Write C programs to simulate the following CPU Scheduling algorithms
   a) FCFS b) SJF c) Round Robin d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
   a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques
   b) Paging b) Segmentation

TEXT BOOKS

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the Unix environment, W.R.Stevens, *Pearson* education.

REFERENCE BOOKS

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition– 2005, *Pearson Education/PHI*
2. Operating System - A Design Approach-Crowley, *TMH*.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, *Pearson/PHI*
4. UNIX Programming Environment, Kernighan and Pike, *PHI/Pearson Education*
5. UNIX Internals: The New Frontiers, U. Vahalia, *Pearson Education*

R18 B.TECH INFORMATION TECHNOLOGY
DATABASE MANAGEMENT SYSTEMS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Co-requisites

1. Co-requisite of course “Database Management Systems”

Objectives

1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation

Outcomes

1. Design database schema for a given application and apply normalization
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers

LIST OF EXPERIMENTS

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Procedures
10. Usage of Cursors

TEXT BOOKS:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata Mc Graw Hill,* 3rd Edition
2. Database System Concepts, Silberschatz, Korth, *Mc GrawHill*, V edition.

REFERENCES:

1. Database 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*
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, *SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student Edition.*

R18 B.TECH COMPUTER SCIENCE AND ENGINEERING
JAVA PROGRAMMING LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Objectives:

1. To write programs using abstract classes.
2. To write programs for solving real world problems using java collection frame work.
3. To write multithreaded programs.
4. To write GUI programs using swing controls in Java.
5. To introduce java compiler and eclipse platform.
6. To impart hands on experience with java programming.

Outcomes:

1. Able to write programs for solving real world problems using java collection frame work.
2. Able to write programs using abstract classes.
3. Able to write multithreaded programs.
4. Able to write GUI programs using swing controls in Java.

Note:

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use of Eclipse platform.
2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

LIST OF EXPERIMENTS

1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

3. **a)** Develop an applet in Java that displays a simple message.
   b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named “Compute” is clicked.

4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread

computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

6. Write a Java program for the following:
   Create a doubly linked list of elements.
   Delete a given element from the above list.
   Display the contents of the list after deletion.

7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with “Stop” or “Ready” or “Go” should appear above the buttons in selected color. Initially, there is no message shown.

8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.

10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

12. Write a Java program that correctly implements the producer – consumer problem using the concept of interthread communication.

13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order

15. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.

REFERENCE BOOKS

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition *Pearson* education.
2. Thinking in Java, Bruce Eckel, *Pearson* Education.
3. Java Programming, D. S. Malik and P. S. Nair, *Cengage* Learning.
4. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, *Pearson*.

R18 B.TECH ELECTRONICS AND COMMUNICATION ENGINEERING
ELECTRONIC DEVICES AND CIRCUITS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

List of Experiments (Twelve experiments to be done):

Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator
3. Full Wave Rectifier with & without filters
4. Input and output characteristics of BJT in CE Configuration
5. Input and output characteristics of FE in CS Configuration
6. Common Emitter Amplifier Characteristics
7. Common Base Amplifier Characteristics
8. Common Source amplifier Characteristics
9. Measurement of h-parameters of transistor in CB, CE, CC configurations
10. Switching characteristics of a transistor
11. SCR Characteristics.
12. Types of Clippers at different reference voltages
13. Types of Clampers at different reference voltages
14. The steady state output waveform of clampers for a square wave input

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30 V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters
5. Electronic Components

R18 B.TECH ELECTRONICS AND COMMUNICATION ENGINEERING
DIGITAL SYSTEM DESIGN LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Note: Implement using digital ICs, all experiments to be carried out.

List of Experiments -

1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization of a 4 – bit gray to Binary and Binary to Gray Converter
6. Design and realization of an 8 bit parallel load and serial out shift register using flip-flops.
7. Design and realization of a Synchronous and Asynchronous counter using flip-flops
8. Design and realization of Asynchronous counters using flip-flops
9. Design and realization of 8x1 MUX using 2x1 MUX
10. Design and realization of 4 bit comparator
11. Design and Realization of a sequence detector-a finite state machine

Major Equipment required for Laboratories:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply.
2. 20 MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.
4. Multimeter.

R18 B.TECH ELECTRONICS AND COMMUNICATION ENGINEERING
BASIC SIMULATION LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Note:

- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 15 experiment are to be completed

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realiazability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Verification of Sampling Theorem.
15. Removal of noise by Autocorrelation / Cross correlation.
16. Extraction of Periodic Signal masked by noise using Correlation.
17. Verification of Weiner-Khinchine Relations.
18. Checking a Random Process for Stationarity in Wide sense.

Major Equipment required for Laboratories:

1. Computer System with latest specifications connected
2. Window Xp or equivalent
3. Simulation software-MAT Lab or any equivalent simulation software

R18 B.TECH ELECTRONICS AND COMMUNICATION ENGINEERING
ANALOG AND DIGITAL COMMUNICATIONS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Note:
- Minimum 12 experiments should be conducted:
- All these experiments are to be simulated first either using MATLAB, COMSIM or any other simulation package and then to be realized in hardware

1. (i) Amplitude modulation and demodulation (ii) Spectrum analysis of AM
2. (i) Frequency modulation and demodulation (ii) Spectrum analysis of FM
3. DSB-SC Modulator & Detector
4. SSB-SC Modulator & Detector (Phase Shift Method)
5. Frequency Division Multiplexing & De multiplexing
6. Pulse Amplitude Modulation & Demodulation
7. Pulse Width Modulation & Demodulation
8. Pulse Position Modulation & Demodulation
9. PCM Generation and Detection
10. Delta Modulation
11. Frequency Shift Keying: Generation and Detection
12. Binary Phase Shift Keying: Generation and Detection
13. Generation and Detection (i) DPSK (ii) QPSK

Major Equipment required for Laboratories:
1. CROs: 20MHz
2. Function Generators: 2MHz
3. Spectrum Analyzer
4. Regulated Power Supplies: 0-30V
5. MAT Lab/Equivalent Simulation Package with Communication tool box
6. Analog and Digital Modulation and Demodulation Trainer Kits.

R18 B.TECH ELECTRONICS AND COMMUNICATION ENGINEERING
IC APPLICATIONS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Note: Verify the functionality of the IC in the given application

Design and Implementation of:

1. Inverting and Non-Inverting Amplifiers using Op Amps
2. Adder and Subtractor using Op Amp.
3. Comparators using Op Amp.
4. Integrator Circuit using IC 741.
5. Differentiator Circuit using Op Amp.
6. Active filter Applications-LPF, HPF (First Order)
7. IC 741 waveform Generators-Sine, Square wave and Triangular Waves.
8. Mono-Stable Multivibrator using IC 555.
9. Astable multivibrator using IC 555.
10. Schmitt Trigger Circuits using IC 741.
11. IC 565-PLL Applications.
12. Voltage Regulator using IC 723
13. Three terminal voltage regulators-7805, 7809, 7912

Major Equipment required for Laboratories:

1. 5 V Fixed Regulated power Supply/ 0-5V or more Regulated Power Supply.
2. 20MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.
4. Multimeter.

R18 B.TECH ELECTRONICS AND COMMUNICATION ENGINEERING
ELECTRONIC CIRCUIT ANALYSIS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Note: 1. Experiments marked with ***** has to be designed, simulated and verified in hardware.
2. Minimum of 9 experiments to be done in hardware.

Hardware Testing in Laboratory:

1. Common Emitter Amplifier **(*)**
2. Two Stage RC Coupled Amplifier
3. Cascode amplifier Circuit **(*)**
4. Darlington Pair Circuit
5. Current Shunt Feedback amplifier Circuit
6. Voltage Series Feedback amplifier Circuit **(*)**
7. RC Phase shift Oscillator Circuit **(*)**
8. Hartley and Colpitt's Oscillators Circuit
9. Class A power amplifier
10. Class B Complementary symmetry amplifier **(*)**
11. Design a Monostable Multivibrator
12. The output voltage waveform of Miller Sweep Circuit

Major Equipment required for Laboratories:

1. Computer System with latest specifications connected
2. Window XP or equivalent
3. Simulation software-Multisim or any equivalent simulation software
4. Regulated Power Suppliers, 0-30 V
5. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
6. Functions Generators-Sine and Square wave signals
7. Multimeters
8. Electronic Components

R18 B.TECH ELECTRONICS AND INSTRUMENTATION ENGINEERING
ELECTRONIC DEVICES AND CIRCUITS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

List of Experiments (Twelve experiments to be done):

Verify any twelve experiments in H/W Laboratory

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator
3. Full Wave Rectifier with & without filters
4. Input and output characteristics of BJT in CE Configuration
5. Input and output characteristics of FE in CS Configuration
6. Common Emitter Amplifier Characteristics
7. Common Base Amplifier Characteristics
8. Common Source amplifier Characteristics
9. Measurement of h-parameters of transistor in CB, CE, CC configurations
10. Switching characteristics of a transistor
11. SCR Characteristics.
12. Types of Clippers at different reference voltages
13. Types of Clampers at different reference voltages
14. The steady state output waveform of clampers for a square wave input

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30 V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters
5. Electronic Components

R18 B.TECH ELECTRONICS AND INSTRUMENTATION ENGINEERING
BASIC SIMULATION LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Note:

- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 15 experiment are to be completed

List of Experiments:

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution for Signals and sequences.
6. Auto Correlation and Cross Correlation for Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of Unit sample, Unit step and Sinusoidal responses of the given LTI system and verifying its physical realiazability and stability properties.
9. Gibbs Phenomenon Simulation.
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Locating the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis, and PSD, Probability Distribution Function.
14. Verification of Sampling Theorem.
15. Removal of noise by Autocorrelation / Cross correlation.
16. Extraction of Periodic Signal masked by noise using Correlation.
17. Verification of Weiner-Khinchine Relations.
18. Checking a Random Process for Stationarity in Wide sense.

Major Equipment required for Laboratories:

1. Computer System with latest specifications connected
2. Window Xp or equivalent
3. Simulation software-MAT Lab or any equivalent simulation software

R18 B.TECH ELECTRONICS AND INSTRUMENTATION ENGINEERING
TRANSDUCERS AND MEASUREMENTS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Course Objectives:

1. To acquire hands on experience in active and passive sensors/transducers.
2. To understand different signal conditioners.
3. To design basic measuring devices like bridges

Course Outcomes: After completion of the course the student is able to:

1. Appreciate the use of sensors.
2. Identify the sensors required for any specific application.
3. Design simple measuring devices.
4. Develop simple measuring systems employing appropriate sensors.

List of Experiments: (Minimum 12 experiments to be conducted)

1. Measurement of Load using Strain Gauge bridge
2. Measurement of Temperature using Thermistor, RTD and Thermocouple
3. Measurement of Displacement using LVDT, use of LVDT for Capacitance measurement
4. Measurement of L,C and R using Bridges and comparing them with Q-Meter
5. Extension of range of DC Ammeter, converting it into Voltmeter
6. Extension of range of AC Voltmeter, converting it into Ammeter
7. Construction of Series and Shunt type Ohm meters using PMMC
8. Measurement of Resistance using Wheatstone Bridge / Kelvin Bridge
9. Measurement of Capacitance using Schering‘s Bridge
10. Measurement of Inductance using Maxwell‘s Bridge
11. Characteristics of Opto-Electric Transducers (Photo Transistor, Photo Diode and LDR)
12. Pressure measurement through Bourdon Tube
13. Radiation and optical Pyrometers
14. Characteristics of pH sensors
15. Characteristics of Conductivity sensors.
16. Characteristics of DO sensors

R18 B.TECH ELECTRONICS AND INSTRUMENTATION ENGINEERING
INDUSTRIAL INSTRUMENTATION LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Course Objectives: Student will be able to

- Understand the basic knowledge of measurement of Velocity, Acceleration, Vibration, Humidity, Density, Viscosity, Sound Level and Intensity of Light.
- Understand the construction, working and calibration of measuring instruments
- Understand various Industrial Bus Protocols

Course Outcomes: After completion of the course the student is able to:

- Understand the knowledge of measurement of various parameters.
- Understand construction, working and calibration of measuring instruments and design.
- Analyze various Industrial Bus Protocols
- Design of signal conditioner for various sensors

LIST OF EXPERIMENTS:

1. Calibration of Pneumatic pressure to Current (P to I) and Current to Pneumatic Pressure (I to P) Converters
2. Measurement of RPM using opto-coupler and comparing it with stroboscope
3. Measurement of precision Angular Velocity and RPM of a rotating Disk
4. Measurement of Velocity, Acceleration and Vibration using Piezo- electric transducer
5. Measurement of Humidity
6. Measurement of intensity of Light
7. Measurement of Sound Level.
8. Measurement of Viscosity of Edible Oil using Redwood Viscometer
9. Measurement of Viscosity of Crude Oil using Saybolt Viscometer
10. Measurement of Density
11. MEMS based Accelerometer
12. Design of signal conditioner for MEMS based Accelerometer
13. MEMS based Gyroscope
14. Design of signal conditioner for MEMS based Gyroscope
15. Experiments based on Industrial Bus Protocols

R18 B.TECH ELECTRONICS AND INSTRUMENTATION ENGINEERING
IC APPLICATIONS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Note: Verify the functionality of the IC in the given application

Design and Implementation of:

1. Inverting and Non-Inverting Amplifiers using Op Amps
2. Adder and Subtractor using Op Amp.
3. Comparators using Op Amp.
4. Integrator Circuit using IC 741.
5. Differentiator Circuit using Op Amp.
6. Active filter Applications-LPF, HPF (First Order)
7. IC 741 waveform Generators-Sine, Square wave and Triangular Waves.
8. Mono-Stable Multivibrator using IC 555.
9. Astable multivibrator using IC 555.
10. Schmitt Trigger Circuits using IC 741.
11. IC 565-PLL Applications.
12. Voltage Regulator using IC 723
13. Three terminal voltage regulators-7805, 7809, 7912

Major Equipment required for Laboratories:

1. 5 V Fixed Regulated power Supply/ 0-5V or more Regulated Power Supply.
2. 20MHz Oscilloscope with Dual Channel.
3. Bread board and components/ Trainer Kit.
4. Multimeter.

R18 B.TECH ELECTRONICS AND INSTRUMENTATION ENGINEERING
ELECTRONIC CIRCUIT ANALYSIS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Note: 1. Experiments marked with ***** has to be designed, simulated and verified in hardware.
2. Minimum of 9 experiments to be done in hardware.

Hardware Testing in Laboratory:

1. Common Emitter Amplifier **(*)**
2. Two Stage RC Coupled Amplifier
3. Cascode amplifier Circuit **(*)**
4. Darlington Pair Circuit
5. Current Shunt Feedback amplifier Circuit
6. Voltage Series Feedback amplifier Circuit **(*)**
7. RC Phase shift Oscillator Circuit **(*)**
8. Hartley and Colpitt's Oscillators Circuit
9. Class A power amplifier
10. Class B Complementary symmetry amplifier **(*)**
11. Design a Monostable Multivibrator
12. The output voltage waveform of Miller Sweep Circuit

Major Equipment required for Laboratories:

1. Computer System with latest specifications connected
2. Window XP or equivalent
3. Simulation software-Multisim or any equivalent simulation software
4. Regulated Power Suppliers, 0-30 V
5. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
6. Functions Generators-Sine and Square wave signals
7. Multimeters
8. Electronic Components

R18 B.TECH METALLURGICAL AND MATERIALS ENGINEERING
MINERAL PROCESSING LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Course objectives:
This laboratory course is designed to make the student to understand and demonstrate the process variables in mineral processing techniques employed. The mineral characteristics like size and size distribution etc. also evaluated.

Course outcomes: The student would gain hands on experience on

- Particle size and its distribution in a given material.
- Determination of reduction ration in crushing and grinding machines.
- To have an understanding on magnetic separation of magnetic ores from non-magnetic.
- To understand about different ore characteristics and various industrial mineral processing operations for beneficiation.

List of experiments:

1. Sampling of an ore from the bulk by i) Coning and quartering method ii) Riffle sampler methods
2. Sizing of material by Sieve analysis.
3. Verification of Stoke's Law.
4. Determining the reduction ratio of a jaw crusher.
5. To determine the variation of reduction ratio with process variables in Rolls crusher.
6. Effect of process variables on reduction ratio and particle size distribution in ball mill.
7. To find the grindability index of coal.
8. Verification of Laws of Communition.
9. Determination of the efficiency of a magnetic separator.
10. Determination of the efficiency of a jig.
11. Particle separation by fluid flow using Wilfley table.
12. Concentration of metallic and non-metallic ores by Froth-Flotation process

List of equipment:

1. Riffle Sampler, ,2. Sieve Shaker with Sieves 3. Stokes' Apparatus, 4. Jaw Crusher, 5. Roll Crusher, 6. Ball Mill, 7. Grindability Index Apparatus, 8. Magnetic Separator, 9. Jig, 10. Wilfly's Table, 11. Froth – Floatation Equipment, 12. Balances

R18 B.TECH METALLURGICAL AND MATERIALS ENGINEERING
METALLOGRAPHY LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Course objectives:
To provide hands on experience to prepare the samples for metallographic analysis and understand the basic constituents of microstructures.

Course outcomes: By completing this laboratory course, students will :

- Get to know and gain hands on experience with various techniques of sample preparation for metallographic analysis of metals and alloys
- Be able to analyse the hardness of different constituents of microstructure using different hardness testers
- Obtain knowledge of quantitative analysis, such as grain size, volume fraction of second phases.

List of experiments:

1. Study of metallurgical microscope
2. Metallographic preparation of metals and alloys
3. Microscopic examination and microstructure interpretation of steels
4. Microscopic examination and microstructure interpretation of nonferrous metals
5. Microscopic examination and microstructure interpretation of heat treated steels
6. Microscopic examination and microstructure interpretation of cast structures
7. Microscopic examination and microstructure interpretation of wrought structures
8. Microscopic examination and microstructure interpretation of welded structures
9. Microscopic examination of defects and failures in components
10. Conduct of Hardness testing of metals on Vickers scale

List of equipment:

1. Metallurgical microscopes, 2. Belt grinders, 3. Disc polishers, 4 Vickers Hardness tester
5. Metallographic Samples (Ferrous and Non-Ferrous)

Text books:

1. R. Haynes, 1984, Springer science + Business Media, New York
2. Douglas B. Murphy, 2001, Wiley-Liss, Inc. USA

R18 B.TECH METALLURGICAL AND MATERIALS ENGINEERING
MATERIALS CHEMISTRY LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Course objectives:
This course introduces chemical analysis of metallic alloys using laboratory practice.

Course Outcomes: At the end of this laboratory course, the student will be able to
1. Identify the major elements in a metallic alloy using chemical methods
2. Quantify specific elements in ferrous and non-ferrous alloys using titration
3. Interpret the results from different spectroscopy instruments to determine chemical composition

List of experiments:
1. Identification of metallic and non-metallic ions in the given substance by wet chemical methods.
2. Estimation of Iron in Iron ore by $KMnO_4$ and $K_2Cr_2O_7$ methods.
3. Estimation of Silicon in Cast Iron by chemical method.
4. Estimation of Manganese in Ferro-alloys by spectrophotometer.
5. Estimation of Sodium and Potassium in Chloride Salts by Flame Photometry.
6. Estimation of Copper in Brass by Electrochemical Analyzer.
7. Estimation of concentration of $KMnO_4$ in the solution using colorimeter.
8. Determination of viscosity of a given fluid by Viscometers (Redwood -I, Redwood – II and Saybolt viscometer).
9. Determination of calorific value of Solid and liquid fuels.

List of Equipment:
1. Flame Photometer, 2. Spectrophotometer. 3. Electrochemical Analyzer. 4. Colorimeters. 5. Chemicals and Glassware. 6. Redwood and Saybolt viscometers. 7 Junker's gas calorimeter, 8. Bomb Calorimeter

Text books:

1. A text book of metallurgical analysis, B C Aggarwal, Khanna Publishers (2002)
2. Corrosion Engineering, Mars Fontana, McGraw Hill (2017)

Reference books:

1. Instrumental methods of analysis, Willard, CBS Publishers & Distributors (2004)
2. Transport phenomena, B. Bird, W.E. Stewart and E.N. Lightfoot, John Wiley & Sons (2007)

R18 B.TECH METALLURGICAL AND MATERIALS ENGINEERING
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-requisites: Basic Electrical and Electronics Engineering

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

List of experiments/demonstrations:

PART A: ELECTRICAL

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   (ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART B: ELECTRONICS

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCES:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

R18 B.TECH METALLURGICAL AND MATERIALS ENGINEERING
MECHANICAL METALLURGY LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Course objectives:
To obtain knowledge on various mechanical testing machines, and mechanical testing methodology.

Course outcomes: After completing the course, the student will be able

- To extract and interpret sensible information from mechanical test data.
- To give explanation on relationships between metallurgy of the metals and their mechanical properties.
- To perform mechanical testing of metals (Hardness, tension and Impact)
- To select metals for engineering applications.
- To design metals for engineering applications.

List of experiments:

1. To determine the Brinell Hardness of ferrous and non-ferrous samples.
2. To determine the Rockwell hardness of ferrous and non-ferrous samples.
3. To determine the hardness of ferrous and non-ferrous samples by using Vickers hardness tester.
4. To Determination of hardness profile across weldments
5. To determine the elastic modulus, ultimate tensile strength, breaking stress, percentage elongation percentage reduction in area of the given specimen by tensile test.
6. To plot True stress Vs True stain and compare with engineering stress strain curve by tensile test.
7. To determine the modulus of rigidity of given material by torsion test
8. To determine the Charpy and Izod (V & U Groove notch) impact strength of a given material at room temperature.
9. To determine the fatigue strength of given material at a given stress

List of equipment:
1. Brinell Hardness Machine 2. Vickers Hardness Machine 3. Rockwell Hardness Machine 4. UTM, 5. Torsion Testing Machine 6. Impact Testing Machine 7. Fatigue Testing Machine

Text books:
1. Appropriate ASTM standards to be followed to understand associated theory.
2. Mechanical Metallurgy by George E Dieter, McGraw-Hill Education; 3rd edition June 1986

R18 B.TECH METALLURGICAL AND MATERIALS ENGINEERING
PHASE TRANSFORMATIONS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Course Objective:
This Laboratory course is designed to make the student understand and demonstrate the various types of heat treatment processes, process variables and surface hardening treatments for ferrous and non-ferrous metals and alloys.

Course outcomes: The student would gain hands on experience
1. To define heat treatment cycles for ferrous and non-ferrous metals and alloys with proper understanding of different heat treatment process variables.
2. To evaluate the microstructure and hardness after successful heat treatment.

List of Experiments:
1. Annealing of plain carbon steel and observation of hardness and microstructure
2. Normalizing of plain carbon steel and observation of hardness and microstructure
3. Hardening of plain carbon steel and observation of hardness and microstructure
4. Study of tempering characteristics of hardened steel.
5. Study of age hardening phenomenon in an Al-Cu alloy or Cu-Be alloy
6. Spheroidizing of high carbon steel
7. Determination of hardenability of a steel using Jominy End Quench Test
8. Re-crystallization studies on cold worked Cu or Cu alloys

Equipment:
1. Muffle Furnaces 1200 ^{0}C, 2. Jominy End Quench Apparatus, 3. Microscopes,
4. Rockwell Hardness Tester

R18 B.TECH MINING ENGINEERING
MINE SURVEYING – I LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-Requisites: NIL

Course Objectives: To familiarize with the various surveying instruments and methods.

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

1. Do the range between the two points and measure the distance between two points
2. Conduct the chain triangulation survey
3. Determine the area by using different methods.
4. Determine the elevation of a given point.
5. Use the instruments used in the surveying.

LIST OF EXPERIMENTS:

1. Ranging a line, measuring the distance between two points, pacing.
2. Chain triangulation, booking, calculation of areas and plotting.
3. Traversing with compass.
4. Introduction to levels.
5. Fly leveling & Reduction of level.
6. Profile leveling and plotting the section.
7. Contouring
8. Measurement of Horizontal angle.
9. Measurement of vertical angle.
10. Theodolite traversing
11. Finding distance between two inaccessible points.

R18 B.TECH MINING ENGINEERING
MECHANICS OF SOLIDS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Pre-Requisites: Nil

Course Objectives:

- Understand basic knowledge on the mechanical behavior of materials like aluminium, mild steel, and cast iron.
- Adopt with the experimental methods to determine the mechanical properties of materials.

Course Outcomes:

- Identify microstructures and wear properties of engineering materials.
- Examine the defects in the materials by non-destructive testing
- Test the important mechanical properties of ferrous and non-ferrous materials.

LIST OF EXPERIMENTS

BRINELL HARDNESS TEST: Determination of Brinell number of a given test specimen.
ROCKWELL HARDNESS TEST: Determination of hardness number of different specimens such as steel, brass, copper and aluminium.
TENSION TEST: Study the behaviour of mild steel and various materials under different loads. To determine
a) Tensile
b) Yield strength
c) Elongation
d) Young ‘s modulus
TORSION TEST: Determine of Modulus of rigidity of various specimens.
IZOD IMPACT TEST: Determination the toughness of the materials like steel, copper, brass and other alloys using Izod test
CHARPY IMPACT TEST: Determine the toughness of the materials like steel, copper, brass and other alloys using Charpy test.
COMPRESSION TEST ON SHORT COLUMN: Determine the compressive stress on material.
COMPRESSION TEST ON LONG COLUMN: Determine Young ‘s modulus of the given long column.
TESTING OF SPRINGS: Determine the stiffness of the spring and the Modulus of rigidity of wire material.
DEFLECTION TEST FOR SSB AND CANTILEVER BEAM: Determine the Young ‘s modulus of the given material with the help of deflection of SSB and cantilever beam

Reference Books:

1. Gere, Timoshenko, —Mechanics of Materials‖, McGraw Hill, 3rd Edition, 1993.
2. R. S Khurmi, Gupta, —Strength of Materials‖, S. Chand, 24th Edition, 2005.
3. William Nash, —Strength of Materials‖, Tata McGraw Hill, 4th Edition, 2004.

R18 B.TECH MINING ENGINEERING
MINING GEOLOGY LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/3/0**	**1.5**

Course Objectives:

The geological concepts, processes, materials and phenomena are well understandable in the field rather than in the class room. An attempt in this direction is to show some important minerals and rocks, models of geological structures, and maps of different kinds in the laboratory.

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

1. Identify the properties of rock forming and ore forming minerals.
2. Determine the strike and dip of planar features by Clinometer Compass.
3. Identify the folds, faults and unconformities.
4. Understand the importance and uses of topographic and geological maps in the mining profession
5. Understand the unconfined compressive strength of important rocks.

List of Experiments:

1. Identification and systematic description of physical properties of important rock-forming and ore-forming minerals (as mentioned in the theory syllabus) (2 Weeks)
2. Identification and systematic description of important igneous, sedimentary and metamorphic rocks (as mentioned in the theory syllabus) (3Weeks)
3. Determination of strike and dip of planar features using /Brunton Compass and the study of models pertaining to folds, faults, unconformities and tunnels.
4. Study and interpretation of Topographic Maps.
5. Study of Geology and Mineral Resources of Telangana, Andhra Pradesh & India (GSI Publications)
6. Study of Metallogenic Map of India (GSI Publication)
7. Vertical Electrical Sounding Survey to determine depth to water table & bed rock.
8. Determination of unconfined compressive strength of rocks (Demonstration)
9. Field work/ visit to the nearby Quarries/Open Cast Mines and Underground Mines to learn Geologic Mapping

Lab Examination Pattern:

1. Identification and description of SIX Minerals.
2. Identification and description of SIX Rocks.
3. Measurement of Strike and Dip of an inclined planar feature (drawing board model) by a clinometer compass.
4. Identification and description of FOUR models pertaining to folds, faults, unconformities and tunnels.
5. Interpretation of a topographic map/ geological map of India/metallogenic map of India.

R18 B.TECH MINING ENGINEERING
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-requisites: Basic Electrical and Electronics Engineering

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

List of experiments/demonstrations:

PART A: ELECTRICAL

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   (ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART B: ELECTRONICS

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCES:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
9. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

R18 B.TECH MINING ENGINEERING
FLUID MECHANICS & HYDRAULICS LAB FOR MINING ENGINEERING

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-Requisites: NIL

Course Objectives:
To provide practical knowledge in principles of fluid flow, losses, performance testing of hydraulic turbines and hydraulic pumps.

Course Outcomes: At the end of the course, students will be able to
1. Analyze the performance of turbines.
2. Analyze the performance of centrifugal and reciprocating pump.
3. Analyze the performance of venturimeter and orifice meter.
4. Determine the minor losses in various pipes.
5. Determine the Bernoulli's apparatus.

LIST OF EXPERIMENTS
1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump / Characteristic curves with and without air vessel
6. Performance Test on Multi Stage Centrifugal Pump / Characteristic curves with and without air vessel
7. Performance Test on Reciprocating Pump / Single, double and three throw row pump
8. Calibration of Venturi meter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Verification of Bernoulli's Theorems

Note: Any 10 of the above 12 experiments are to be conducted.

R18 B.TECH MINING ENGINEERING
MINE SURVEYING – II LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-Requisites: NIL

Course Objectives:
To familiarize with the various surveying instruments and methods

Course Outcomes: At the end of the course, students will be able to
1. Conduct the correlation by two shaft co-planar method.
2. Conduct the correlation by shaft weisbatch methods and shaft weiss quadrilateral methods.
3. Set a curve by ranging offsets from long chord and ranging ranking method.
4. Set a curve by Tacheometric and ranging tacheometric methods.

LIST OF EXPERIMENTS (Any 10 to 12 Experiments to be done minimum)
1. Determination of constants k and C by tachemometric surveying.
2. Tachemometric surveying by stadia method- distance and elevation formulae for staff vertical.
3. Tachemometric surveying by stadia method- distance and elevation formulae for staff normal.
4. Tachemometric surveying by tangential method- when both angles are angles of elevation.
5. Tachemometric surveying by tangential method when both angles are angle of depression.
6. Tachemometric surveying by tangential method when one angle is elevation and other depression.
7. Curve ranging by offsets/ordinates from the long chord.
8. Curve ranging by Rankine's method of tangential (or deflection) angle.
9. Correlation in single shaft by co-plantation method.
10. Correlation in single shaft by Weisbach triangle method.
11. Correlation in two shafts by weiss quadrilateral method
12. Finding the height of an in accessible object.
13. Reading mine plans and sections.
14. Using total station for measurement of volumes

Suggested Text Books/Reference Books

1. Surveying- Vol. II by Punimia
2. Surveying and Levelling by kanetkar.
3. Mine Surveying and Levelling by Ghatak.

R18 B.TECH AERONAUTICAL ENGINEERING
MECHANICS OF SOLIDS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-Requisites: Nil

Course Objectives:

- Understand basic knowledge on the mechanical behavior of materials like aluminum, mild steel, and cast iron.
- Adopt with the experimental methods to determine the mechanical properties of materials.

Course Outcomes:

- Identify microstructures and wear properties of engineering materials.
- Examine the defects in the materials by non-destructive testing
- Test the important mechanical properties of ferrous and non-ferrous materials.

LIST OF EXPERIMENTS

BRINELL HARDNESS TEST: Determination of Brinell number of a given test specimen.
ROCKWELL HARDNESS TEST: Determination of hardness number of different specimens such as steel, brass, copper and aluminium.
TENSION TEST: Study the behaviour of mild steel and various materials under different loads. To determine
a) Tensile
b) Yield strength
c) Elongation
d) Young ‘s modulus
TORSION TEST: Determine of Modulus of rigidity of various specimens.
IZOD IMPACT TEST: Determination the toughness of the materials like steel, copper, brass and other alloys using Izod test
CHARPY IMPACT TEST: Determine the toughness of the materials like steel, copper, brass and other alloys using Charpy test.
COMPRESSION TEST ON SHORT COLUMN: Determine the compressive stress on material.
COMPRESSION TEST ON LONG COLUMN: Determine Young ‘s modulus of the given long column.
TESTING OF SPRINGS: Determine the stiffness of the spring and the Modulus of rigidity of wire material.
DEFLECTION TEST FOR SSB AND CANTILEVER BEAM: Determine the Young ‘s modulus of the given material with the help of deflection of SSB and cantilever beam

Reference Books:

1. Gere, Timoshenko, —Mechanics of Materials‖, McGraw Hill, 3rd Edition, 1993.
2. R. S Khurmi, Gupta, —Strength of Materials‖, S. Chand, 24th Edition, 2005.
3. William Nash, —Strength of Materials‖, Tata McGraw Hill, 4th Edition, 2004.

R18 B.TECH AERONAUTICAL ENGINEERING
FLUID MECHANICS AND HYDRAULICS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/4/0**	**2**

Course Objectives:

- Gain knowledge on working of centrifugal pumps, positive displacement pumps, hydraulic turbines centrifugal blowers and steam turbines.
- Compare performance of various machines at different operating points.
- Knowledge of various flow meters and the concept of fluid mechanics.

Course Outcomes:

- Obtain the necessary practical skills & real time knowledge
- Apply scientific method for analysing the qualitatively & quantitatively to solve the problems.
- Flow behaviour in various geometry of cross sectional

LIST OF EXPERIMENTS

1. **CALIBRATION:** Calibration of Venturi meter and orifice meter.
2. **PIPE FLOW LOSSES:** Determination of pipe flow losses in rectangular and circular pipes
3. **BERNOULLI'S THEOREM:** Verification of Bernoulli's theorem.
4. **REYNOLDS EXPERIMENT:** Determination of Reynolds Number of fluid flow
5. **IMPACT OF JET ON VANES:** Study Impact of jet on Vanes.
6. **CENTRIFUGAL PUMPS:** Performance test on centrifugal pumps.
7. **RECIPROCATING PUMPS:** Performance test on reciprocating pumps.
8. **PELTON WHEEL TURBINE:** Performance test on piston wheel turbine.
9. **FRANCIS TURBINE:** Performance test on Francis turbine.
10. **FLOW THROUGH WEIRS:** Rate of discharge Flow through Weirs
11. **FLOW THROUGH NOTCH:** Flow through rectangular and V-Notch
12. **FLOW THOUGH ORIFICE MOUTH PIECE:** Flow analysis of different shapes of mouth pieces

Reference Books:

1. Yuan S W, —Foundations of fluid Mechanics‖, Prentice-Hall, 2nd Edition, 1987.
2. Milne Thompson L M, —Theoretical Hydrodynamics‖, MacMillan, 5th Edition, 1968.
3. Rathakrishnan. E, —Fundamentals of Fluid Mechanics‖, Prentice-Hall, 5th Edition, 2007.
4. Som S. K., Biswas. G, —Introduction to fluid mechanics and fluid machines‖, Tata Mc Graw-Hill, 2nd Edition, 2004.

R18 B.TECH AERONAUTICAL ENGINEERING
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-requisites: Basic Electrical and Electronics Engineering

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

List of experiments/demonstrations:

PART A: ELECTRICAL

1. Verification of KVL and KCL
2. (i) Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
   (ii) Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star) in a Three Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a Separately Excited DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART B: ELECTRONICS

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies (iv) CRO.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CB / CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

TEXT BOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

REFERENCES:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
4. Linear circuit analysis (time domain phasor and Laplace transform approaches) - 2nd edition by Raymond A. De Carlo and Pen-Min-Lin, Oxford University Press-2004.
5. Network Theory by N. C. Jagan & C. Lakshminarayana, B.S. Publications.
6. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

R18 B.TECH AERONAUTICAL ENGINEERING
AERODYNAMICS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-Requisites: Aerodynamics -1 and Low Speed Aerodynamics

Course Objectives:

- Understand the behavior of flow properties over different models using subsonic wind tunnel.
- Demonstrate experimentally the pressure distribution over circular, symmetric and cambered airfoils and evaluate lift and drag.
- Illustrate flow visualization studies at low speeds over different aerodynamic bodies.

Course Outcomes:

- Point out the pressure distribution of symmetrical and unsymmetrical airfoil and 2D cylinder.
- Examine flow visualization of airfoil and bluff bodies

LIST OF EXPERIMENTS

1. Calibration of subsonic wind tunnel.
2. Pressure Distribution-Cylinder
3. Pressure Distribution-Symmetric Airfoil
4. Pressure Distribution-Cambered Airfoil
5. Force measurement using wind tunnel balance.
6. Flow Over a Flat Plate
7. Flow visualization studies in low speed over cylinder
8. Flow Visualization Studies - Airfoil Flow visualization studies in low speed over airfoil at different angles of incidence.
9. Wake analysis over a cylinder and airfoils
10. Blower Test Rig; Efficiency of blower test rig for 3 different vane settings.
11. Axial Flow Compressor; Efficiency of axial flow compressor
12. Centrifugal Flow Compressor

Reference Books:

1. L. J. Clancy, Aerodynamics", Pitman, 1st Edition, 1986.
2. Alan pope, Low Speed Wind Tunnel Testingǁ, John Wiley, 2nd Edition, 1999.
3. N. M. Komerath, Low Speed Aerodynamicsǁ, Extrovert, 1st Edition, 2012.

R18 B.TECH AERONAUTICAL ENGINEERING
AEROSPACE STRUCTURES LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-Requisites: Theory of Structure

Course Objectives:

- Provide basic knowledge on the mechanical behavior of materials like aluminum, mild steel, and cast iron.
- Visualize the crack detection using various NDT methods and also discuss the changing strength due to these defects.
- Understand the concept of locating the shear centre for open and closed section of beams.
- Obtain buckling strength of both long and short columns using different elastic supports.

Course Outcomes:

- Various load testing methodology and selecting the suitable structure for different components

LIST OF EXPERIMENTS

1. Direct Tension Test; Tensile testing using UTM, mechanical and optical extensometers, stress strain curves and strength test or various engineering materials.
2. Deflection Test; Stress and deflections of beams for various end conditions, verification of Maxwell‘s theorem
3. Buckling Test; Compression tests on long columns, Critical buckling loads.
4. Buckling Test; Compression tests on short columns, Critical buckling loads, south well plot.
5. Bending test; Unsymmetrical Bending of a Beam.
6. Shear Centre for Open Section; Shear Centre of an open Section beam.
7. Shear Centre for Closed Section; Shear Centre of a closed Section beam.
8. Wagner’s Theorem; Wagner beam – Tension field beam.
9. Sandwich Panel Tension Test; Fabrication and determine the young‘s Modulus of a sandwich structures.
10. Non-Destructive Testing; Study of non-destructive testing procedures using dye penetration,
11. Non-destructive Testing; Magnetic particle inspection and ultrasonic techniques.
12. vibration Test; Determination of natural frequency of beams under free and forced vibration using.

Reference Books:

1. Megson, T.H.G., Aircraft Structures for Engineering Students, 4th edn., Elsevier, 2007, ISBN 0-750-667397.
2. Peery, D.J. and Azar, J.J., Aircraft Structures, 2nd edn, McGraw-Hill, 1982, ISBN 0-07-049196-8.

3. Bruhn. E.H, Analysis and Design of Flight Vehicles Structures, Tri-state Off-set Company, USA, 1965.
4. Lakshmi Narasaiah, G., Aircraft Structures, BS Publications, 2010.

R18 B.TECH AERONAUTICAL ENGINEERING
AIRCRAFT MATERIALS AND PRODUCTION LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-Requisites: Nil

Course Objectives:

- Understand the basic conventional machining operation using for aircraft structural members production.
- Illustrate other unconventional machining techniques required for aircraft production.
- Perform the basic computer numerical control machining operation required for aircraft production technology.

Course Outcomes:

- Operate the various machines used in production, different welding techniques

LIST OF EXPERIMENTS

1. **Basic Metallurgy -I:** Preparation and study of microstructure of pure materials like Cu and Al. Hardenability of steels by Jominy End Quench test
2. **Basic Metallurgy -II:** Study of microstructures of non-ferrous alloys. Study of microstructure of heat-treated steel.
3. **Lathe Operations:** Introduction- lathe machine, plain turning, Step turning & grooving, Taper turning-compound rest/offset method & Drilling using lathe, External Threading-Single start
4. **Shaping & Slotting;** Shaping-V-Block & Slotting-Keyways.
5. **Grinding & Milling:** Grinding-Cylindrical /Surface/Tool & cutter. Milling-Polygon / Spur gear, Gear hobbing-Helical gear.
6. **Drilling;** Drilling, reaming, counter boring, Counter sinking Taping.
7. **CNC Machining;** Basic operations, Introduction to CNC programming.
8. **Welding Processes I;** Gas Welding, Brazing, Electric and Black smithy, Soldering.
9. **welding Process II;** Arc welding. Spot welding, Seam welding, TIG welding and MIG Welding.
10. **Basic Casting;** Casting of plaster of Paris using different dies.
11. **Riveting Aluminium Sheets;** Spot and Blind Rivets on aluminum sheets

Reference Books:

1. Keshu S. C, Ganapathy K. K, —Air craft production techniques‖, Interline Publishing House, Bangalore, 3rd Edition, 1993.
2. R. K Jain-Khanna, —Production technology‖, Mc Graw Hill, 1st Edition, 2002.
3. O. P Khanna, Lal. M. Dhanpat Rai, —Production technology, 5th Edition, 1997.

R18 B.TECH MECHANICAL ENGINEERING (MECHATRONICS)
MECHANICS OF SOLIDS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Pre-Requisites: Nil

Course Objectives:

- Understand basic knowledge on the mechanical behavior of materials like aluminum, mild steel, and cast iron.
- Adopt with the experimental methods to determine the mechanical properties of materials.

Course Outcomes:

- Identify microstructures and wear properties of engineering materials.
- Examine the defects in the materials by non-destructive testing
- Test the important mechanical properties of ferrous and non-ferrous materials.

LIST OF EXPERIMENTS

BRINELL HARDNESS TEST: Determination of Brinell number of a given test specimen.

ROCKWELL HARDNESS TEST: Determination of hardness number of different specimens such as steel, brass, copper and aluminium.

TENSION TEST: Study the behaviour of mild steel and various materials under different loads. To determine

a) Tensile
b) Yield strength
c) Elongation
d) Young ‘s modulus

TORSION TEST: Determine of Modulus of rigidity of various specimens.

IZOD IMPACT TEST: Determination the toughness of the materials like steel, copper, brass and other alloys using Izod test

CHARPY IMPACT TEST: Determine the toughness of the materials like steel, copper, brass and other alloys using Charpy test.

COMPRESSION TEST ON SHORT COLUMN: Determine the compressive stress on material.

COMPRESSION TEST ON LONG COLUMN: Determine Young ‘s modulus of the given long column.

TESTING OF SPRINGS: Determine the stiffness of the spring and the Modulus of rigidity of wire material.

DEFLECTION TEST FOR SSB AND CANTILEVER BEAM: Determine the Young ‘s modulus of the given material with the help of deflection of SSB and cantilever beam

Reference Books:

1. Gere, Timoshenko, —Mechanics of Materialsǁ, McGraw Hill, 3rd Edition, 1993.
2. R. S Khurmi, Gupta, —Strength of Materialsǁ, S. Chand, 24th Edition, 2005.
3. William Nash, —Strength of Materialsǁ, Tata McGraw Hill, 4th Edition, 2004.

R18 B.TECH MECHANICAL ENGINEERING (MECHATRONICS)
MATERIAL SCIENCE AND METALLURGY LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Conduct any 10 experiments:

1. Study of Metallographic Specimen preparation
2. Study of the Micro Structure of pure ferrous metals
3. Study of the Micro Structure of pure Nonferrous metals
4. Study of the Microstructure of plain carbon steels.
5. Study of the Micro Structures of Cast Irons.
6. Study of the Micro Structures of Non-Ferrous alloys.
7. To carry out the annealing treatment to the given plain carbon steel and study of the Micro structures and hardness
8. To carry out the Normalizing treatment to the given plain carbon steel and study of the Micro structures and hardness
9. To carry out the Hardening treatment to the given plain carbon steel and study of the Micro structures and hardness
10. To carry out the tempering treatment to the given hardened plain carbon steel and study of the Micro structures and hardness
11. Determine Hardenability of a given steels by Jominy End Quench Test.

R18 B.TECH MECHANICAL ENGINEERING (MECHATRONICS)
ELECTRONIC DEVICES AND CIRCUITS LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Course Objectives:

- To identify various components and testing of active devices.
- To study and operation of millimeters, function generators, regulated power supplies and CRO To know the characteristics of various active devices.
- To study frequency response amplifier.

Course Outcomes:

- After Completion of the course the student is able to Apply various devices to real time problems.
- Compute frequency response of various amplifiers.

PART A: (Only for Viva-voce Examination) Electronic Workshop Practice (In 3 Lab Sessions):

1. Identification, Specifications, Testing of R, L, C Components (Color Codes), Potentiometers, Switches (SPDT, DPDT, and DIP), Coils, Gang Condensers, Relays, Bread Boards, PCB's
2. Identification, Specifications and Testing of Active Devices, Diodes, BJT's, Low power JFET's, MOSFET's, Power Transistors, LED's, LCD's, SCR, UJT.
3. Study and operation of
    i. Multimeters (Analog and Digital)
    ii. Function Generator
    iii. Regulated Power Supplies
    iv. CRO.

PART B: (For Laboratory Examination – Minimum of 10 experiments)

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Input & Output Characteristics of Transistor in CB Configuration and h-parameter calculations.
4. Input & Output Characteristics of Transistor in CE Configuration and h-parameter calculations.
5. Half Wave Rectifier with & without filters.
6. Full Wave Rectifier with & without filters.
7. FET characteristics.
8. Design of Self-bias circuit.
9. Frequency Response of CC Amplifier.
10. Frequency Response of CE Amplifier.
11. Frequency Response of Common Source FET amplifier.
12. SCR characteristics.
13. UJT Characteristics

PART C: Equipment required for Laboratory:

1. Regulated Power supplies (RPS) : 0-30 V
2. CRO's : 0-20 MHz.
3. Function Generators : 0-1 MHz.
4. Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital) : 0-20 μA, 0-50 μA, 0-100 μA, 0-200 μA, 10 mA.
8. Voltmeters (Analog or Digital) : 0-50 V, 0-100 V, 0-250 V
9. Electronic Components : Resistors, Capacitors, BJTs, LCDs, SCRs, UJTs, FETs, LEDs, MOSFETs, Diodes-Ge& Si type, Transistors – NPN, PNP type.

R18 B.TECH MECHANICAL ENGINEERING (MECHATRONICS)
ELECTRICAL ENGINEERING LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Note: Any 12 of the above experiments are to be conducted.

List of Experiments.

1. Verification of KVL and KCL.
2. Serial and Parallel Resonance.
3. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
4. Verification of Superposition theorem.
5. Verification of Reciprocity theorem.
6. Verification of maximum power transfer theorem.
7. Verification of Thevenin's theorem.
8. Verification of compensation theorem.
9. Verification of Milliman's theorem.
10. Verification of Norton's theorem.
11. Magnetization characteristics of D.C. Shunt generator.
12. Swinburne's Test on DC shunt machine.
13. Brake test on DC shunt motor.
14. OC & SC tests on Single-phase transformer.
15. Load Test on Single Phase Transformer.

R18 B.TECH MECHANICAL ENGINEERING (MECHATRONICS)
THERMAL ENGINEERING LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

NOTE: Perform any **TEN** out of TWELVE experiments from the above.

List of Experiments.

1. I.C. Engines Performance Test of 4 -S single cylinder Diesel Engine
2. Heat Balance test on 4-S single cylinder Diesel Engine
3. I.C. Engines Performance Test of 4 -S double cylinder Diesel Engine
4. I.C. Engines-Determination of A/F Ratio and Volumetric Efficiency
5. Performance Test on Variable Compression Ratio Engines.
6. I C Engine Performance test on 2-Stroke SI Engine
7. I C Engine Morse and retardation Test
8. Performance Test on Reciprocating Air Compressor
9. Study of I.C. Engines Valve / Port Timing Diagrams
10. Performance test on Air-Conditioning Unit
11. Dis-Assembly and Assembly of a automobile vehicle
12. Study of Boiler Models

R18 B.TECH MECHANICAL ENGINEERING (MECHATRONICS)
FLUID MECHANICS AND HEAT TRANSFER LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Any six experiments from each Lab.

(A) FLUID MECHANICS LAB

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Calibration of Venturi meter.
6. Calibration of Orifice meter.
7. Determination of friction factor for a given pipe line.
8. Determination of loss of head due to sudden contraction in a pipeline.

Any six experiments from each Lab

(B) HEAT TRANSFER LAB

1. Composite Slab Apparatus – Overall heat transfer co-efficient.
2. Heat transfer through lagged pipe.
3. Heat Transfer through a Concentric Sphere
4. Thermal Conductivity of given metal rod.
5. Heat transfer in forced convection apparatus.
6. Heat transfer in natural convection
7. Emissivity apparatus.
8. Stefan Boltzman Apparatus.

R18 B.TECH PETROLEUM ENGINEERING
GEOLOGY LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisites: Basic knowledge of Geology

Course Objectives:

- The students should be in a position to
- read, understand and interpret the supplied maps
- understand the steps to be followed for completing any field job successfully

Course Outcomes: The student will be in a position to

- read, understand and interpret different maps like Toposheet, Structural Geology maps, Stratigraphic maps, geological cross-sections, Isopach maps, Structural Contour maps etc.
- understand how to locate own / outcrop positions on Toposheet and how to take traverse
- understand geological formations and measure dip and strike reading correctly in the filed
- calculate true dip, true thickness, Oil Water Contact (OWC) from given maps
- explain different sediment depositional environments from stratigraphic columns

List of Experiments:

1. Study of physical properties of minerals in hand specimen
2. Study of common rocks with reference to their common structures, mineral composition and uses.
3. Identification of minerals under microscopes
4. Identification of rocks under microscopes
5. Location of observed outcrops on the Toposheet. Geological mapping and Traversing.
6. Measurement of the strike and dip in the field
7. Interpretation of Topographic Maps
8. Interpretation of Geological Maps: (1) Attitude, (2) Cross-sections, (3) Unconformable beds, (4) Folded beds, (5) Faults and geological intrusions (dykes and sills)
9. Interpretation of isopach maps
10. Interpretation of litho stratigraphic columns and litho stratigraphic correlation
11. Interpretation of structural contour map and location of Oil Water Contact (OWC)
12. Interpretation of isopach map and depositional model.
13. Estimation of Thickness, Distance, and Depth of subsurface Ore Bodies

R18 B.TECH PETROLEUM ENGINEERING
BASIC ENGINEERING (MECHANICAL + ELECTRICAL) LAB

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/4/0**	**2**

Section A: Mechanical Engineering Laboratory:

Course Objective: To impart practical exposure on the performance evaluation methods of various mechanical components like, I. C. Engine, Hydraulic turbine, hydraulic pump, Air compressor etc. and also understand the various processes that can be performed on a lathe machine.

Course Outcome: The student will be able to predict the performance of several mechanical components and operate a lathe machine to produce the required job work.

List of Experiments

1. Draw the valve timing diagram of a 4-stroke diesel engine and port timing diagram of a 2-stroke petrol engine.
2. Perform load test on a 4-stroke I.C .Engine and draw the performance curves.
3. Pattern design and making – for one casting drawing.
4. Taper turning and thread cutting on a Lathe machine.
5. Performance on an Impulse/Reaction Hydraulic Turbine.
6. Performance of Centrifugal/Reciprocating Pump.
7. Find the volumetric efficiency, isothermal efficiency of an Air compressor.

Section B: Electrical Engineering Laboratory

Course Objectives: This course imparts knowledge to the students to:

- Learn the estimation of efficiency of a DC machine as motor & generator.
- Learn the estimation of efficiency of transformer at different load conditions & power factors.
- Study the performance of a 3-Phase induction motor by conducting direct test.
- Pre-determine the regulation of an alternator by Synchronous impedance method.
- Understand the speed control of a DC shunts motor.
- Study the performance of a DC shunts motor by conducting direct test.

Course Outcomes: After successful completion of the course, the students will be able to:

- Estimate the efficiency of a DC machine as motor & generator.
- Estimate the efficiency of transformer at different load conditions & power factors.
- Understand the performance of a 3-Phase induction motor by conducting direct test.
- Pre-determine the regulation of an alternator by Synchronous impedance method.
- Control the speed of a DC shunt motor by Field flux control method & Armature Voltage control method.
- Understand the performance characteristics of a DC shunt motor by conducting direct test.

List of Experiments:

1. Swinburne's test on D.C. Shunt machine. (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors)
3. Brake test on 3-phase Induction motor (Determination of performance characteristics)
4. Regulation of alternator by Synchronous impedance method.
5. Speed control of D.C. Shunt motor by
   a) Armature Voltage control b) Field flux control method
6. Brake test on D.C Shunt Motor

R18 B.TECH PETROLEUM ENGINEERING
SURVEYING LAB FOR PETROLEUM ENGINEERS

B.Tech. II Year I Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisites: Basic knowledge of Civil Engineering and Survey

Course Objectives:

- To have the ability for applying knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in land surveying
- To gain an appreciation of the need for lifelong learning through the discussion of recent changes in survey procedures and equipment
- To have the ability for using techniques, skills, and modern engineering tools necessary for engineering practice
- To build the ability for working as a member of a team
- To understand the importance of professional licensure to protect the public in the practice of land surveying.

Course Outcomes: After the completion of the said lab, the students will

- appreciate the need for accurate and thorough note taking in field work to serve as a legal record
- gain the ability to use modern survey equipment to measure angles and distances
- gain a basic understanding of the principles and operation of the Global Positioning System
- gain the ability to measure differences in elevation, draw and utilize contour plots, and calculate volumes for earthwork
- improve ability to function as a member of a survey party in completing the assigned field work
- Appreciate the need for licensed surveyors to establish positioning information for property and structures.

List of Experiments:

- Study of linear measuring instruments and chain surveying.
- Study of theodolite and traversing with theodolite,
- Study of levels and ordinary levelling with tilting level, Profile levelling,
- Study of total station and measurement with total station.
- Study of Global Positioning System (GPS) and measurement with GPS.
- Determination of distance between two inaccessible points with compass.
- Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment
- Radiation method and Intersection method by plane table survey.
- Two point problems in plane table survey.
- Three point problems in plane table survey.
- Traversing by plane table survey.
- Fly levelling (differential levelling)

R18 B.TECH PETROLEUM ENGINEERING
MATHEMATICAL METHODS FOR PETROLEUM ENGINEERING

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisites: Mathematical Methods

Course Objectives: The Lab emphasizes on writing MATLAB code, execution and doing what if analysis of the variations in the parameters for the given problems.

Course Outcomes: The Students will be able to

- apply mathematical methods to Petroleum Engineering Problems.
- write code in MATLAB.

List of problems:

1. Determination of Molar volume and Compressibility from Redlich-Kwong Equation
2. Calculation of flow rate in a pipeline
3. Correlation of the physical properties
4. Compressibility factor variation from vanderwaals equation
5. Isothermal compression of gas using Redlich-Kwong Equation of state
6. Thermodynamic properties of steam from Redlich-Kwong Equation
7. Solution of Stiff Ordinary Differential Equations
8. Iterative Solution of ODE boundary value problem
9. Shooting method for solving two-point boundary value problems
10. Expediting the solution of systems of nonlinear algebraic equations
11. Solving differential algebraic equations –DAEs
12. Method of lines for Partial Differential Equations
13. Estimating model parameters involving ODEs using fermentation data

TEXTBOOK:

Problem solving in Chemical and Biochemical Engineering with POLYMATH, Excel and MATLAB by Michael B. Cutlip and Mordechai Shacham, Prentice Hall, 2008.

R18 B.TECH PETROLEUM ENGINEERING
CHEMICAL ENGINEERING FLUID MECHANICS LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisites: Basic knowledge of Fluid Mechanics

Course Objectives: The lab provides knowledge on various flow patterns, flow measuring devices and pumps.

Course Outcomes: Student will be able to understand the concept of fluid flow phenomena, different flow regimes, flow measuring devices like venturi, orifice and rotameter.

List of Experiments

1. Identification of laminar and turbulent flows
   Major equipment - Reynolds apparatus
2. Measurement of point velocities
   Major equipment - Pitot tube setup
3. Verification of Bernoulli's equation
   Major equipment – Bernoulli's Apparatus
4. Calibration of Rotameter
   Major equipment – Rotameter Assembly
5. Variation of Orifice coefficient with Reynolds Number
   Major equipment - Orifice meter Assembly
6. Determination of Venturi coefficient
   Major equipment – Venturi meter Assembly
7. Friction losses in Fluid flow in pipes
   Major equipment - Pipe Assembly with provision for Pressure measurement
8. Pressure drop in a packed bed for different fluid velocities
   Major equipment - Packed bed with Pressure drop measurement
9. Pressure drop and void fraction in a fluidized bed
   Major equipment - Fluidized bed with Pressure drop measurement
10. Studying the coefficient of contraction for a given open orifice
    Major equipment - Open Orifice Assembly
11. Studies of performance characteristics of a Reciprocating Pump
12. Studying the Characteristics of a centrifugal pump
    Major equipment - Centrifugal Pump

R18 B.TECH PETROLEUM ENGINEERING
PROCESS HEAT TRANSFER LAB

B.Tech. II Year II Sem.	**L**	**T/P/D**	**C**
	0	**0/2/0**	**1**

Prerequisites: Basic knowledge of Process Heat Transfer

Course Objectives: This lab will provide practical knowledge on various heat transfer process and equipment like heat exchangers and evaporators

Course Outcomes: The student will be able to understand the thermal conductivity measurement, heat transfer coefficient, calculation in natural and forced convection and some of the radiation aspects.

List of Experiments

1. Determination of total thermal resistance and thermal conductivity of composite wall.
   Major equipment - Composite wall Assembly
2. Determination of thermal conductivity of a metal rod.
   Major equipment - Thermal Conductivity apparatus
3. Determination of natural convective heat transfer coefficient for a vertical tube.
   Major equipment - Natural convection heat transfer apparatus
4. Determination of critical heat flux point for pool boiling of water.
   Major equipment- Pool boiling apparatus
5. Determination of forced convective heat transfer coefficient for air flowing through a pipe
   Major equipment – Forced convection heat transfer apparatus
6. Determination of overall heat transfer coefficient in double pipe heat exchanger.
   Major equipment - Double pipe heat exchanger apparatus
7. Determination of heat transfer coefficient for a helical coil in an agitated vessel.
   Major equipment – Helical coil in a agitated vessel.
8. Study of the temperature distribution along the length of a pin-fin under natural and forced convection conditions.
   Major equipment - Pin fin apparatus
9. Estimation of un-steady state film heat transfer coefficient between the medium in which the body is cooled.
   Major equipment - Heat transfer coefficient determination apparatus
10. Determination of Stefan – Boltzmann constant.
    Major equipment - Stefan Boltzmann apparatus
11. Determination of emissivity of a given plate at various temperatures.
    Major equipment - Emissivity determination apparatus
12. Determination of overall heat transfer coefficient in 1-2 heat exchanger.
    Major equipment - 1-2 heat exchanger

GENDER SENSITIZATION LAB
(COMMON FOR ALL BRANCHES)

GENDER SENSITIZATION LAB

(An Activity-based Course)

COURSE DESCRIPTION

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality.

This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

Objectives of the Course

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Learning Outcomes

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

Unit-I: UNDERSTANDING GENDER

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men

- Preparing for Womanhood. Growing up Male. First lessons in Caste.

Unit – II: GENDER ROLES AND RELATIONS

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences- Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit – III: GENDER AND LABOUR

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit – IV: GENDER - BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No!-Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*
Domestic Violence: Speaking OutIs Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit – V: GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

Note: **Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.**

- ***Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".***

☞ **ESSENTIAL READING**: The Textbook, "*Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu **published by Telugu Akademi, Telangana Government in 2015.**

ASSESSMENT AND GRADING:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%