Physics Lab

List of Experiments

Any ten experiments (at least four from each group).

Group A

1. To determine the wavelength of sodium light by Newton"s ring experiment.
2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating.
3. To determine the specific rotation of cane sugar solution using polarimeter.
4. To determine the focal length of the combination of two lenses separated by a distance and verify the formula for the focal length of combination of lenses.
5. To measure attenuation in an optical fiber.
6. To determine the wavelength of He-Ne laser light using single slit diffraction.
7. To study the polarization of light using He-Ne laser light.
8. To determine the wavelength of sodium light with the help of Fresnel"s bi-prism.
9. To determine the coefficient of viscosity of a given liquid.
10. To determine the value of acceleration due to gravity (g) using compound pendulum.

Group B

1. To determine the energy band gap of a given semiconductor material.
2. To study Hall effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall effect setup.
3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
4. To verify Stefan"s law by electric method.
5. To determine resistance per unit length and specific resistance of a given resistance using Carey Foster's Bridge.
6. To study the resonance condition of a series LCR circuit.
7. To determine the electrochemical equivalent (ECE) of copper.
8. To calibrate the given ammeter and voltmeter by potentiometer.
9. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.
10. To measure high resistance by leakage method.

Reference Books

1. Practical Physics- K. K. Dey & B. N. Dutta (Kalyani Publishers New Delhi)
2. Engineering Physics-Theory and Practical- Katiyar& Pandey (Wiley India)
3. Engineering Physics Practical- S K Gupta (KrishnaPrakashan Meerut)

Course Outcomes:
1. To determine the wavelength of sodium light by Newton"s ring experiment
2. To determine the wavelength of sodium light with the help of Fresnel"s bi-prism
3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
4. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.

CHEMISTRY- PRACTICAL

LIST OF EXPERIMENTS

1. Determination of alkalinity in the given water sample.
2. Determination of temporary and permanent hardness in water sample using EDTA.
3. Determination of iron content in the given solution by Mohr"s method.
4. Determination of viscosity of given liquid.
5. Determination of surface tension of given liquid.
6. Determination of chloride content in water sample.
7. Determination of available chlorine in bleaching powder.
8. Determination of pH by pH-metric titration.
9. Preparation of Phenol-formaldehyde and Urea-formaldehyde resin.
10. Determination of Cell constant and conductance of a solution.
11. Determination of rate constant of hydrolysis of esters.
12. Verification of Beer"s law.

NOTE: Choice of any 10 experiments from the above. Institute can change any 02 experiments from the aforesaid experiments.

Course Outcomes:

1. Use of different analytical instruments.
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water.
3. Measure hardness of water.
4. Estimate the rate constant of reaction.

ELECTRICAL ENGINEERING LABORATORY

LIST OF EXPERIMENTS

Note: A minimum of ten experiments from the following should be performed.

1. Verification of Kirchhoff"s laws

2. Verification of Superposition and Thevenin Theorem.

3. Measurement of power and power factor in a single phase ac series inductive circuit and study improvement of power factor using capacitor

4. Study of phenomenon of resonance in RLC series circuit and obtain resonant frequency.

5. Connection and measurement of power consumption of a fluorescent lamp (tube light).

6. Measurement of power in 3- phase circuit by two wattmeter method and determination of its power factor for star as well as delta connected load.

7. Determination of parameters of ac single phase series RLC circuit

8. To observe the B-H loop of a ferromagnetic material in CRO.

9. Determination of (i) Voltage ratio (ii) polarity and (iii) efficiency by load test of a single phase transformer

10. Determination of efficiency of a dc shunt motor by load test

11. To study running and speed reversal of a three phase induction motor and record speed in both directions.

12. Demonstration of cut-out sections of machines: dc machine, three phase induction machine, single-phase induction machine and synchronous machine.

Programming for Problem Solving Lab

1. WAP that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.

2. WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard.

3. WAP to calculate the area and circumference of a circle.

4. WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula C/5=(F-32)/9.

5. WAP that swaps values of two variables using a third variable.

6. WAP that checks whether the two numbers entered by the user are equal or not.

7. WAP to find the greatest of three numbers.

8. WAP that finds whether a given number is even or odd.

9. WAP that tells whether a given year is a leap year or not.

10. WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria:

Between 90-100%--------------Print „A‟

80-90%------------------------- Print „B‟

60-80%------------------------- Print „C‟

Below 60%--------------------- Print „D‟

11. WAP that takes two operands and one operator from the user and perform the operation and prints the result by using Switch statement.

12. WAP to print the sum of all numbers up to a given number.

13. WAP to find the factorial of a given number.

14. WAP to print sum of even and odd numbers from 1 to N numbers.

15. WAP to print the Fibonacci series.

16. WAP to check whether the entered number is prime or not.

17. WAP to find the sum of digits of the entered number.

18. WAP to find the reverse of a number.

19. WAP to print Armstrong numbers from 1 to 100.

20. WAP to convert binary number into decimal number and vice versa.

21. WAP that simply takes elements of the array from the user and finds the sum of these elements.

22. WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and prints them.

23. WAP to find the minimum and maximum element of the array.

24. WAP to search an element in a array using Linear Search.

25. WAP to sort the elements of the array in ascending order using Bubble Sort technique.

26. WAP to add and multiply two matrices of order nxn.

27. WAP that finds the sum of diagonal elements of a mxn matrix.

28. WAP to implement strlen (), strcat (),strcpy () using the concept of Functions.

29. Define a structure data type TRAIN_INFO. The type contain Train No.: integer type Train name: string Departure Time: aggregate type TIME Arrival Time: aggregate type TIME Start station: string End station: string The structure type Time contains two integer members: hour and minute. Maintain a train timetable and implement the following operations:

(i) List all the trains (sorted according to train number) that depart from a particular section. (ii) List all the trains that depart from a particular station at a particular time.

(iii) List all he trains that depart from a particular station within the next one hour of a given time. (iv) List all the trains between a pair of start station and end station.

30. WAP to swap two elements using the concept of pointers.

31. WAP to compare the contents of two files and determine whether they are same or not.

32. WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.

WORKSHOP PRACTICE

LIST OF EXPERIMENTS

Machine shop:

1. Study of machine tools in particular Lathe machine
2. Demonstration of different operations on Lathe machine
3. Practice of Facing, Plane Turning, step turning, taper turning, knurling and parting.
4. Study of Quick return mechanism of Shaper.

Fitting shop:

1. Preparation of T-Shape Work piece as per the given specifications.
2. Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding.
3. Practice marking operations.

Carpentry:

1. Study of Carpentry Tools, Equipment and different joints.
2. Practice of Cross Half lap joint, Half lap Dovetail joint and Mortise Tenon Joint

Electrical & Electronics

1. Introduction to House wiring, different types of cables. Types of power supply, types of motors, Starters, distribution of power supply, types of bulbs, parts of tube light, Electrical wiring symbols.
2. Soldering and desoldering of Resistor in PCB.
3. Soldering and desoldering of IC in PCB.
4. Soldering and desoldering of Capacitor in PCB

Welding:

1. Instruction of BI standards and reading of welding drawings.
2. Butt Joint
3. Lap Joint
4. TIG Welding
5. MIG Welding

Casting:

1. introduction to casting processes

Smithy

1. Sharpening any arc and edge.
2. Preparing small arc and edge,
3. Repair of agricultural implements and power plough, use of power hammer etc.

Plastic Moulding& Glass Cutting

1. Introduction to Patterns, pattern allowances, ingredients of moulding sand and melting furnaces. Foundry tools and their purposes
2. Demo of mould preparation
3. Practice – Preparation of mould
4. Glass cutting

ELECTRONICS & COMMUNICATION ENGINEERING

REC451: MICROPROCESSORS AND MICROCONTROLLERS LAB

1. To study 8085 microprocessor system.
2. i) Write a program using 8085 Microprocessor for Decimal, Hexadecimal addition and subtraction of two Numbers.
   ii)   Write a program using 8085 Microprocessor for addition and subtraction of two BCD numbers.
   iii)   To perform multiplication and division of two 8 bit numbers using 8085.
3. Learn and understand how to configure MSP-EXP430G2 Launchpad digital I/O pins. Write a C program for configuration of GPIO ports for MSP430 (blinking LEDs, push buttons interface).
   Exercises:
   a) Modify the delay with which the LED blinks.
   b) Modify the code to make the green LED blink.
   c) Modify the code to make the green and red LEDs blink:
       i. Together
       ii. Alternately
   d) Alter the code to turn the LED ON when the button is pressed and OFF when it is released.
   e). Alter the code to make the green LED stay ON for around 1 second every time the button is pressed.
   f). Alter the code to turn the red LED ON when the button is pressed and the green LED ON when the button is released.
4. Usage of Low Power Modes:
   Configure the MSP-EXP430G2 Launchpad for Low Power Mode (LPM3) and measure current consumption both in active and low power modes. Use MSPEXP430FR5969 as hardware platform and measure active mode and standby mode current.

   a) How many Low power modes are supported by the MSP430G2553 platform?
   b) Measure the Active and Standby Current consumption in LPM3 mode for the same application using MSP430F5529 LaunchPad
1   Learn and understand GPIO based Interrupt programming. Write a C program and associated GPIO ISR using interrupt programming technique.
   Exercises:
       Write the code to enable a Timer interrupt for the pin P1.1.
       Write the code to turn on interrupts globally

2　Implement Pulse Width Modulation to control the brightness of the on-board, green LED. This experiment will help you to learn and understand the configuration of PWM and Timer peripherals of the MSP430G2553.

Exercises:
1. Observe the PWM waveform on a particular pin using CRO.
2. What is the maximum resolution of PWM circuitry in MSP430G2 Launchpad?
3. Change the above code to create a PWM signal of 75% duty cycle on particular PWM pin.

3　The main objective of this experiment is to control the on-board, red LED by the analog input from a potentiometer. This experiment will help you to learn and understand how to configure an ADC to interface with a potentiometer.

Exercises:
1　Alter the threshold to 75% of Vcc for the LED to turn on.
2　Modify the code to change the Reference Voltage from Vcc to 2.5V.

4　Learn and understand how to configure the PWM and ADC modules of the MSP-EXP430G2 Launchpad to control the DC motor using external analog input.

Exercises:
What is the maximum resolution of PWM circuitry in MSP430G2 LaunchPad and how it can be achieved using program?
Create a PWM signal of 75% duty cycle on particular PWM pin.
Create Switch case code from the example code to run the DC Motor in 3 set of speeds.

5　Understand the ULP Advisor capabilities and usage of ULP Advisor to create optimized, power-efficient applications on the MSP-EXP430G2 Launchpad.

Exercises:
How does the ULP Advisor software help in designing power-optimized code?
Which ULP rule violation helps us to detect a loop counting violation?
Connect the MSP430 to terminal on PC and echo back the data

6　Configure of Universal Serial Communication Interface (USCI) module of MSP430G2553 for UART based serial communication. The main objective of this experiment is to use UART of the MSP430G2553 to communicate with the computer.

Exercise:
Modify the above code to transmit the set of strings to the serial terminal via UART as shown below:
char str1[]="MSP430G2 launchpad"
char str2[]= "Ultra low power mixed signal processing applications"

7　Understand and Configure 2 MSP430F5529 Launchpads in master-slave communication mode for SPI protocol.

Exercises:
Which port pins of MSP430 can be configured for SPI communication?
What is the data transfer rate supported by MSP430 for SPI communication?

REC452: ADVANCED ELECTRONICS SYSTEM LAB

Transistor Modeling and Circuits

2 Metal Oxide Semiconductor Field Effect Transistors (MOSFETs) *DC
     biasing of Common Source
     *MOSFET Common Source Amplifier
     *MOSFET Source Follower *Current Mirror
3 SPICE parameters for MOSFET transistors.
4 Step-Down (Buck) DC-DC Converters.
5 Step-Up (Boost) DC-DC Converter
6 CMOS Amplifier design.

-MOSFET based Ring oscillators
-MOSFET based Relaxation oscillators
 - MOSFET based Voltage-controlled oscillators
- Integration of crystal oscillator into circuits

Data Conversion
    - Analog to Digital Conversion
        * Successive Approximation ADC
    - Digital to Analog Conversion
        * Scaled Resistor Network

    - System-level stability: decoupling, ground loops
     - Basics of EMC and screening
-      Examples of complete electronic systems

REC453: ELECTRONIC MEASUREMENT & INSTRUMENTATION LAB

1. Study of semiconductor diode voltmeter and its use as DC average responding AC voltmeter.
2. Study of L.C.R. Bridge and determination of the value of the given components.
3. Study of distortion factor meter and determination of the % distortion of the given scillator.
4. Study of the transistor tester and determination of the parameters of the given transistors.
5. Study of the following transducer (i) PT-100 transducer (ii) J- type transducer (iii) K-type transducer (iv) Pressure transducer
6. Measurement of phase difference and frequency using CRO (Lissajous Figure)
7. Measurement of low resistance Kelvin's double bridge.
8. To measure unknown capacitance of small capacitors by using Schering's bridge.
9. To measure unknown Inductance using Hay's bridge.
10. To measure unknown frequency using Wein's frequency bridge.

RCS456: DATA STRUCTURE AND ALGORITHMS LAB

1. Run time analysis of Fibonacci Series
2. Study and Application of various data Structure
3. Study and Implementation of Array Based Program
   a. Searching (Linear Search, Binary Search)
   b. Sorting (Bubble, Insertion, Selection, Quick, Merge etc)
   c. Merging
4. Implementation of Link List
   a. Creation of Singly link list, Doubly Linked list
   b. Concatenation of Link list
   c. Insertion and Deletion of node in link list
   d. Splitting the link list into two link list

5. Implementation of STACK and QUEUE with the help of
   a. Array
   b. Link List
6. Implementation of Binary Tree, Binary Search Tree, Height Balance Tree
7. Write a program to simulate various traversing Technique
8. Representation and Implementation of Graph
   a. Depth First Search
   b. Breadth First Search
   c. Prim`s Algorithm
   d. Kruskal`s Algorithms
9. Implementation of Hash Table

REC651   MICROWAVE ENGINEERING LAB

List of Experiments

3. To study microwave test bench.
4. To study the characteristics of reflex klystron tube and to determine its electronic tuning range.
5. To determine the frequency and wavelength in a rectangular waveguide working on TE_{01} mode.
6. To study measurement of reflection coefficient and standing wave ratio using double minima method.
7. To study V-I characteristic of Gunn diode.
8. To measure an unknown impedance with Smith chart.
9. Study of Circulator/Isolator.
10. Study of Attenuator (Fixed and Variable type).
11. To study simple dipole 2 antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
12. To study folded dipole antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
13. To study 2 phase array end-fire antenna and to calculate beam-width, front / back ratio, and gain of the antenna.
14. To study broadside array antenna and to calculate beam-width, front / back ratio, and gain of the antenna.

REC652   COMMUNICATION LAB – II
List of Experiments

7   To construct a Square wave with the help of Fundamental Frequency and its Harmonic component

8   Study of pulse data coding & decoding techniques for NRZ and RZ formats.

9   Study of Manchester coding and Decoding.

10   Study of Amplitude shift keying modulator and demodulator.

11   Study of Frequency shift keying modulator and demodulator.

12   Study of Phase shift keying modulator and demodulator.

13   Study of single bit error detection and correction using Hamming code.

14   Study of Quadrature Phase shift keying modulator and demodulator.

15   To simulate Differential Phase shift keying technique using MATLAB software.

16   To simulate M-ary Phase shift keying technique using MATLAB software (example8PSK, 16PSK) and perform BER calculations.

17   To simulate convolutional coding using MATLAB software.

18   Design a front end BPSK modulator and demodulator.

RIC653CONTROL SYSTEM LAB-I

List of Experiments:

1.   Different Toolboxes in MATLAB, Introduction to Control Systems Toolboxor its equivalent open source freeware software like Scilabusing Spoken Tutorial MOOCs.

2.   Determine transpose, inverse values of given matrix.

3.   Plot the pole-zero configuration in s-plane for the given transfer function.

4.   Determine the transfer function for given closed loop system in block diagram representation.

5.   Plot unit step response of given transfer function and find delay time, rise time, peak time and peak overshoot.

6.   Determine the time response of the given system subjected to any arbitrary input.

7.   Plot root locus of given transfer function, locate closed loop poles for different values of k. Also find out Wd and Wnat for a given root.

8.   Create the state space model of a linear continuous system.

9.   Determine the State Space representation of the given transfer function.

10.   Plot bode plot of given transfer function. Also determine the relative stability by measuring gain and phase margins.

11.   Determine the steady state errors of a given transfer function.

12.   Plot Nyquist plot for given transfer function and to discuss closed loop stability. Also determine the relative stability by measuring gain and phase margin.

RIC651   MICROCONTROLLERS FOR EMBEDDED SYSTEMS LAB

1.   Write a program of Flashing LED connected to port 1 of the 8051 Micro Controller

2.   Write a program to generate 10 kHz square wave using 8051.

3.   Write a program to show the use of INT0 and INT1 of 8051.

4.   Write a program for temperature & to display on intelligent LCD display.

5.   Write a program to generate a Ramp waveform using DAC with micro controller.

6.   Write a program to Interface GPIO ports in C using MSP430 (blinking LEDs , push buttons)

7.   Write a program Interface potentiometer with GPIO.

8.   Write a program of PWM based Speed Control of Motor controlled by potentiometer connected to GPIO.

9.   Write a program of PWM generation using Timer on MSP430 GPIO.

10.   Write a program to Interface an accelerometer.

11.   Write a program using USB (Sending data back and forth across a bulk transfer-mode USB connection.)

12.   Write a program for Master Slave Communication between 2 MSP430s using SPI

13.   Write a program of basic Wi-Fi application – Communication between two MSP430 based sensor nodes.
14.   Setting up the CC3100 as a HTTP server.

15.   Review of User APIs for TI CC3100 & Initialization and Setting of IP addresses.

COMPUTER SCIENCE & ENGINEERING

RCS451: OPERATING SYSTEMS LAB

1. To implement CPU Scheduling Algorithms
   - FCFS
   - SJF
   - SRTF
   - PRIORITY
   - ROUND ROBIN
2. Simulate all Page Replacement Algorithms
   - FIFO
   - LRU
3. Simulate Paging Technique of Memory Management

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

RCS452: SOFTWARE ENGINEERING LAB

For any given case/ problem statement do the following;
1. Prepare a SRS document in line with the IEEE recommended standards.
2. Draw the use case diagram and specify the role of each of the actors. Also state the precondition, post condition and function of each use case.
3. Draw the activity diagram.
4. Identify the classes. Classify them as weak and strong classes and draw the class diagram.
5. Draw the sequence diagram for any two scenarios.
6. Draw the collaboration diagram.
7. Draw the state chart diagram.
8. Draw the component diagram.
9. Perform forward engineering in java. (Model to code conversion)
10. Perform reverse engineering in java. (Code to Model conversion)
11. Draw the deployment diagram.

RCS453: TAFL Lab

Understanding of software like JFLAP for experimenting with formal languages
1. Deterministic Finite Automata (DFA)
2. Nondeterministic Finite Automata (NFA)
3. Conversion of NFA to DFA
4. DFA Minimization
5. DFA to regular grammar conversion
6. DFA to regular expression conversion
7. Combining automata
8. Regular expression to DFA conversion
9. Mealy and Moore machine

10. Pushdown automata
11. Single tape Turing machine
12. Multi-tape Turing machine
13. Context free grammars (CFG) with single symbols
14. CFG with multiple symbols
15. LL Parsing
16. LR Parsing
17. Regular expressions
18. Regular pumping lemma
19. Context free pumping lemma
20. CFG to Chomsky Normal form transformation

RCS454: PYTHON LANGUAGE PROGRAMMING LAB

Write a Python program to: -
1. Demonstrate the working of 'id' and 'type' functions
2. To find all prime numbers within a given range.
3. To print 'n terms of Fibonacci series using iteration.
4. To demonstrate use of slicing in string
5.
   a. To add 'ing' at the end of a given string (length should be at least 3). If the given string already ends with 'ing' then add 'ly' instead. If the string length of the given string is less than 3, leave it unchanged.
      Sample String : 'abc'
      Expected Result : 'abcing'
      Sample String : 'string'
      Expected Result : 'stringly'
   b. To get a string from a given string where all occurrences of its first char have been changed to '$', except the first char itself.
6.
   To compute the frequency of the words from the input. The output should output after sorting the key alphanumerically.
   Write a program that accepts a comma separated sequence of words as input and prints the words in a comma-separated sequence after sorting them alphabetically.
7. Write a program that accepts a sequence of whitespace separated words as input and prints the words after removing all duplicate words and sorting them alphanumerically.
8. To demonstrate use of list & related functions
9. To demonstrate use of Dictionary& related functions
10. To demonstrate use of tuple, set& related functions
11. To implement stack using list
12. To implement queue using list
13. To read and write from a file
14. To copy a file
15. To demonstrate working of classes and objects
16. To demonstrate class method & static method
17. To demonstrate constructors

18. To demonstrate inheritance
19. To demonstrate aggregation/composition
20. To create a small GUI application for insert, update and delete in a table using Oracle as backend and front end for creating form

RCS-651: COMPUTER NETWORKS LAB

5. To learn handling and configuration of networking hardware like RJ-45 connector, CAT-6 cable, crimping tool, etc.
6. Configuration of router, hub, switch etc. (using real devices or simulators)
7. Running and using services/commands like ping, trace route, nslookup, arp, telnet, ftp, etc.
8. Network packet analysis using tools like Wireshark, tcpdump, etc.
9. Network simulation using tools like Cisco Packet Tracer, NetSim, OMNeT++, NS2, NS3, etc.
10.   Socket programming using UDP and TCP (e.g., simple DNS, data & time client/server, echo client/server, iterative & concurrent servers)
11.   Programming using raw sockets
12.   Programming using RPC

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

RCS-652: COMPILER DESIGN LAB

1. Implementation of LEXICAL ANALYZER for IF STATEMENT
2. Implementation of LEXICAL ANALYZER for ARITHMETIC EXPRESSION
3. Construction of NFA from REGULAR EXPRESSION
4. Construction of DFA from NFA
5. Implementation of SHIFT REDUCE PARSING ALGORITHM
6. Implementation of OPERATOR PRECEDENCE PARSER
7. Implementation of RECURSIVE DESCENT PARSER
8. Implementation of CODE OPTIMIZATION TECHNIQUES
9. Implementation of CODE GENERATOR

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

RCS-653: COMPUTER GRAPHICS LAB

1. To implement DDA algorithms for line and circle.
2. To implement Bresenham's algorithms for line, circle and ellipse drawing
3. To implement Mid Point Circle algorithm using C .
4. To implement Mid Point Ellipse algorithm using C .
5. To perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
6. To implement Cohen–Sutherland 2D clipping and window–viewport mapping.
7. To implement Liang Barksy Line Clipping Algorithm.
8. To perform 3D Transformations such as translation, rotation and scaling.
9. To convert between color models.
10. To perform animation using any Animation software
11. To perform basic operations on image using any image editing software
12. To draw different shapes such as hut, face, kite, fish etc.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

RCS-654: Data Warehousing & Data Mining Lab

It is expected that student should implement concept of Data Mining and Warehousing. The open source Data Mining Tools like Rapid Miner, Weka etc. can be used to implement the concept of Data Mining and Warehousing. Some examples are as follows (Subject Teacher may add more):

4. Implementation of OLAP operations
5. Implementation of Varying Arrays
6. Implementation of Nested Tables
7. Demonstration of any ETL tool
8. Write a program of Apriori algorithm using any programming language.
9. Create data-set in .arff file format. Demonstration of preprocessing on WEKA data-set.
10. Demonstration of Association rule process on data-set contact lenses.arff /supermarket (or any other data set) using apriori algorithm.
11. Demonstration of classification rule process on WEKA data-set using j48 algorithm.
12. Demonstration of classification rule process on WEKA data-set using Naive Bayes algorithm.
13. Demonstration of clustering rule process on data-set iris.arff using simple k-means.

CIVIL ENGINEERING

RCE452: GEOINFORMATICS LAB

1.   Demonstration and working on Electronic Total Station. Measurement of distances, horizontal & vertical angles and coordinates.
2.   Measurement of area of a land parcel using Total Station.
3.   To layout a precise traverse in a given area and to compute the adjusted coordinates of survey stations.
4.   Demonstration and working with Mirror stereoscopes, Parallax bar and Aerial photographs.
5.   Visual Interpretation of standard FCC (False colour composite).
6.   Digitization of physical features on a map/image using GIS software.
7.   Coordinates measurement using GPS.

RCE453: STRUCTURAL ANALYSIS LAB

1.   To determine Flexural Rigidity (EI) of a given beam
2.   To verify Maxwell's Reciprocal theorem.
3.   To find horizontal thrust in a three-hinged arch and to draw influence line diagrams for Horizontal Thrust end Bending moment.
4.   To find horizontal thrust in a two hinged arch and to draw influence line diagrams for horizontal Thrust and bending moment.
5.   To find deflection of curved members.
6.   To find bar forces in a three members structural frames with pin jointed bar
7.   To find Critical load in Struts with different end conditions.
8.   To find deflections in Beam having unsymmetrical bending.

RCE454: BUILDING PLANNING & DRAWING LAB

Drawing and drafting of following with CAD software
1.   Introduction to the tools and commands of drafting software.
2.   Working in layers, blocks, x-ref, drawing layout and print setup.
3.   3D drafting and rendering
4.   Planning and drafting of elevation and cross section of door and window
5.   Planning and drafting of plan and cross section of Dog legged and open well staircase.
6.   Planning and Drawings of Residential building of 1 room set (plan and section).
7.   Planning and drawing of 3 room residential building with staircase.
8.   Preparation of details general arrangement drawing of 4 room duplex house including planning and drafting.

RCE455: HYDRAULICS & MACHINE LAB

Note: Ensure to conduct at least 10 experiments from the list:

1.   To determine the Manning's coefficient of roughness 'n' for the bed of a given flume.
2.   To study the velocity distribution in an open channel and to determine the energy and momentum correction factors
3.   To study the flow characteristics over a hump placed in an open channel.
4.   To study the flow through a horizontal contraction in a rectangular channel.
5.   To calibrate a broad-crested weir.
6.   To study the characteristics of free hydraulic jump.
7.   To study centrifugal pump and their characteristics
8.   To study characteristics of Pelton Turbine.
9.   To study characteristics Francis Turbine.
10.   To study characteristics of Kaplan Turbine.
11.   To study the free overfall phenomenon in an open channel and to determine the end depth
12.   To determine coefficient of discharge for given rectangular notch.
13.   To determine coefficient of disc.

RCE 651 CAD LAB- 2

1. Working on Latest Version of Environmental Engineering software for Analysis and Design of water & wastewater treatment and distribution systems (WATER CAD / SEWER CAD /

2.   WATER GEM / SEWER GEM /LOOP)

3. Working on Latest Version of Transportation Engineering software like MAX ROAD/ Surveying Software.

4.   Working on Latest Version of GIS software (ARC GIS / ENVI / GEPSY)

RCE 652   ENVIRONMENTAL ENGINEERING LAB

1. Determination of turbidity and conductivity.

2. Determination of pH, alkalinity and acidity.

3. Determination of hardness and chlorides.

4. Determination of residual chlorine.

5. Determination of MPN (most probable number) of coliforms.

6. Measurement of SPM and PM10 with high volume sampler.

7. Measurement of sound level with sound level meter.

8. Determination of total , suspended and dissolved solids.

9. Determination of BOD.

10. Determination of COD.

11. Determination of kjeldahl nitrogen.

12. Determination of fluoride.

13. Determination of optimum dose of coagulants by Jar Test Apparatus.

14. Field Visit of Water/ Sewage Treatment Plant of a nearby area.

Note: 1. Experiment at S.NO. 14 is mandatory.

2.Any 8 Experiments out of the S.NO 1 to 13 are to be performed.

RCE 653 TRANSPORTATION ENGINEERING LAB

1. To Determine the Crushing Value of Coarse Aggregates.
2. To Determine the Impact Value of Coarse Aggregates.
3. To determine the Flakiness Index and Elongation Index of Coarse Aggregates.
4. To determine the Los Angeles Abrasion Value of Coarse Aggregates.
5. To determine the Stripping Value of Coarse Aggregates.
6. To determine the penetration Value of Bitumen.
7. To determine the Softening Point of Bituminous material.
8. To determine the Ductility Value of Bituminous material.
9. To determine the Flash and Fire Point of Bituminous material.
10. To determine the Stripping Value of Bituminous material.
11. Classified both directional Traffic Volume Study.
12. Traffic Speed Study. (Using Radar Speedometer or Enoscope).
13. Determination of CBR Value of soil sample in the Lab or in Field.
14. Note: A minimum of 8 experiments are to be performed from the list of Experiments.

RCE 654   STRUCTURAL DETAILING LAB

1. Study of SP34/IS13920/IS456:2000 for detailing of structural elements.
2. Preparation of working hand sketches and Auto CAD drawings for the following-RC
Beams- Simply supported, Continuous, Cantilever
   a. T – beam / L-beam floor
      i. Slabs – Simply supported, Continuous, One way and
         two way slabs. Columns – Tied Columns and Spirally
         reinforced columns.
   b. Isolated footings for RC Columns.
   c. Combined rectangular and trapezoidal footings.
3. Preparation of bar bending schedule
4. Detailing of Buildings with respect to Earthquake Resistant Design
5. Study of full set of structural drawing of a building as made available by Institute.

MECHANICAL ENGINEERING

REE459: ELECTRICAL MACHINES & CONTROLS LAB

Note: To perform at least 7 experiments of Electrical Machines and 3 experiments of Control Systems

A. Electrical Machines
1. To obtain speed-torque characteristics and efficiency of a dc shunt motor by direct loading.
2. To obtain efficiency of a dc shunt machine by no load test.
3. To obtain speed control of dc shunt motor using (a) armature voltage control (b) field control.
4. To determine polarity and voltage ratio of single phase and three phase transformers.
5. To obtain efficiency and voltage regulation by performing O.C. and S.C. tests on a single phase transformer at full load and 0.8 p.f. loading.
6. To obtain 3-phase to 2-phase conversion using Scott connection.
7. To perform load test on a 3-phase induction motor and determine (a) speed- torque characteristics (b) power factor v/s line current characteristics.
8. To study speed control of a 3-phase induction motor using (a) Voltage Control (b) Constant (Voltage/ frequency) control.
9. To perform open circuit and short circuit test on a 3-phase synchronous machine and determine voltage regulation at full load and unity, 0.8 lagging and 0.8 leading power factor using synchronous impedance method.
10. To determine V-curve of a 3-phase synchronous motor at no load, half load and full load.

B. Control Systems:
1. To determine transient response of a second order system for step input for various values of constant 'K' using linear simulator unit and compare theoretical and practical results.
2. To study P, PI and PID temperature controller for an oven and compare their performance.
3. To determine speed – torque characteristics of an a.c. 2-phase servo motor.
4. To study and calibrate temperature using Resistance Temperature Detector(RTD)
5. To study dc servo position control system within P and PI configurations.
6. To study synchro transmitter and receiver system and determine output V/s input characteristics.
7. To study open loop and closed loop control of a dc separately excited motor.

RME451:MEASUREMENT & METROLOGY LAB

Minimum 8 experiments out of following (or such experiment) are to be performed:
1.   Study the working of simple measuring instruments- Vernier calipers, micrometer, tachometer.
2.   Measurement of effective diameter of a screw thread using 3 wire method.
3.   Measurement of angle using sine bar & slip gauges. Study of limit gauges.
4.   Study & angular measurement using level protector.
5.   Adjustment of spark plug gap using feeler gauges.
6.   Study of dial indicator & its constructional details.
7.   Use of dial indicator to check a shape run use.
8.   Use of dial indicator and V Block to check the circularity and plot the polar Graph.
9.   Study and understanding of limits, fits & tolerances.
10.   Experiment on measurement of pressure.
11.   Study of temperature measuring equipments.
12.   Measurement using Strain gauge.
13.   Measurement of speed using stroboscope.
14.   Experiment on measurement of flow.
15.   Measurement of vibration/power.
16.   Experiment on dynamometers.
17   To study the displacement using LVDT.

RME452 :MANUFACTURING TECHNOLOGY-I LAB

Minimum 8 experiments out of following (or such experiment) are to be performed:
1.   Design of pattern for a desired casting (containing hole).
2.   Pattern making with proper allowance.
3.   Making a mould (with core) and casting.
4.   Sand testing methods (at least one, such as grain fineness number determination)
5.   Injection moulding with plastics
6.   Forging - hand forging processes
7.   Forging - power hammer study & operation
8.   Tube bending with the use of sand and on tube bending m/c.
9.   Press work experiment such as blanking/piercing, washer, making etc.
10.   Wire drawing/extrusion on soft material.
11.   Rolling-experiment.
12.   Bending & spring back.
13.   Powder metallurgy experiment.
14.   Jigs & Fixture experiment.
15.   Any other suitable experiment on manufacturing science / process / technique.

RME453: COMPUTER AIDED MACHINE DRAWING-II LAB

Note: All drawing conform to BIS Codes.

Introduction: Conventional representation of machine components and materials, Conventional representation of surface finish, Roughness number symbol, Symbols of Machine elements and welded joints. Classification of Drawings: Machine drawings, Production drawing, part drawing and assembly drawing. Introduction to detail drawing and bill of materials (BOM).

Limits, Fits and Tolerances: General aspects, Nominal size and basic dimensions, Definitions, Basis of fit or limit system, Systems of specifying tolerances, Designation of holes, Shafts and fits, Commonly used holes and shafts. List of Standard Abbreviation used.

Part Modeling: Introduction to part modeling of simple machine components using any 3D software (like CATIA, PRO E, UGNX, Autodesk Inventor or SOLIDWORKS) covering all commands/ features to develop a part model *(**Minimum 24 machine components need to be developed**).*

Part Modeling & Assemblies of: Plummer Block Bearing, Machine Vice, Screw Jack, Engine Stuffing box, Lathe Tailstock, Feed Check Valve and Rams Bottom Safety Valve.

FLUID MACHINERY Lab

Minimum ten experiments out of the following along with study of the machines and processes

1.   Impact of Jet experiment.

2.   Experiment on Pelton wheel.

3.   Experiment on Francis turbine.

4.   Experiment on Kaplan turbine.

5.   Experiment on Reciprocating pump.

6.   Experiment on centrifugal pump.

7.   Experiment on Hydraulic Jack/Press

8.   Experiment on Hydraulic Brake

9.   Experiment on Hydraulic Ram

10.   Study through visit of any water pumping station/plant

11.   Any other suitable experiment/test rig such as comparison & performance of different types of pumps and turbines.

12.   Experiment on Compressor

13.   Experiment for measurement of drag and lift on aerofoil in wind tunnel

THEORY OF MACHINES LAB

Minimum eight experiments out of the following:

1   Study of simple linkage models/mechanisms

2.   Study of inversions of four bar linkage

3.   Study of inversions of single/double slider crank mechanisms

4.   Experiment on Gears tooth profile, interference etc.

5.   Experiment on Gear trains

6.   Experiment on longitudinal vibration

7.   Experiment on transverse vibration

8.   Experiments on dead weight type governor

9.   Experiment on spring controlled governor

10.   Experiment on critical speed of shaft

11.   Experiment on gyroscope

12.   Experiment on static/dynamic balancing

13.   Experiment on Brake

14.   Experiment on clutch

Design And Simulation - Lab II

A. Computer and Language :students are required to learn the basics of computer language such as Cand C++
so that they should be able to write the computer programme (*3practical turns*)

B. Writing Computer programme for conventional design: Students are required to write computerprogram and
validate it for the design of machine components done in theory subject (*5practical turns*)

C. Mini Project: Each student will be given a real life problem for the complete design of asubsystem/system
using either manual calculation with the help of design handbook or through computer programme, if needed.
This will be done as home assignment to be submitted at the end of the semester.

REFRIGERATION & AIR CONDITIONING Lab

Minimum eight experiments out of the following:

1   Experiment on refrigeration test rig and calculation of various performance parameters.

2   Study of different types of expansion devices used in refrigeration system.

3   Study of different types of evaporators used in refrigeration systems.

4   To study basic components of air-conditioning system.

5   Experiment on air-conditioning test rig & calculation of various performance parameters.

6   Experiment on air washers

7   Study of window air conditioner.

8   Study & determination of volumetric efficiency of compressor.

9   Visit of a central air conditioning plant and its detailed study.

10   Visit of cold-storage and its detailed study.
11   Experiment on Ice-plant.

12   Experiment on two stage Reciprocating compressor for determination of volumetric efficiency , PV diagram and effect of intercooling.

13   Study of Hermetically sealed compressor.

14   Experiment on Desert coolers.