DEPARTMENT OF ELECTRICAL ENGINEERING
LAB DETAILS & LAB MANUALS

<u>Lab Manual</u>

1. BASIC ELECTRICAL ENGINEERING LAB
BEE-C151

LIST OF EXPERIMENTS

1. Verification of Kirchhoff's laws.
2. Verification of Thevenin's theorems.
3. Verification of Norton's theorem
4. Verification of Superposition theorem.
5. Verification of maximum power transfer theorem.
6. Measurement of power in three-phase circuit by two wattmeter method.
7. Determination of efficiency of a single-phase transformer by load test.
8. To perform open circuit test on single-phase transformer & find equivalent circuit parameters.
9. To perform short circuit test on single-phase transformer & find equivalent circuit parameters.
10. D.C. generator characteristics
    (a) Shunt generator
    (b) Series generator
    (c) Compound generator
11. Speed control of D.C. shunt motor
12. To study running and reversing of a three-phase Induction Motor.
13. To study & calibration of a single-phase Energy Meter.
14. Calibration of voltmeter and ammeter.
15. To study of resonance in RLC circuit.

Manual of Basic Electrical Engineering Lab
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2. ELECTRICAL MACHINES-I LAB
BEE-C 351

LIST OF EXPERIMENTS

1. To obtain magnetization characteristics of a D.C. shunt generator.
2. To obtain load characteristics of a D.C. compound generator (a) Cummulatively compounded (b) Differentially compounded.
3. To obtain load characteristics of a D.C. shunt generator.
4. To obtain speed-torque characteristics of a D.C. shunt motor.
5. To obtain speed-torque characteristics of a D.C. series motor.
6. To obtain efficiency of a D.C. shunt machine using Swinburn's test.
7. To obtain speed control of dc shunt motor using (a) armature resistance control (b) field control
8. To perform open circuit and short circuit tests on a single-phase transformer and determine parameters of equivalent circuit.
9. To obtain 3-phase to 2-phase conversion by Scott connection.
10. To obtain efficiency and voltage regulation of a single phase transformer by load test.
11. To perform Sumpner's test (back-to-back) on single-phase transformers.
12. To perform parallel operation of single phase transformer

Manual of Electrical MachineS I Lab
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3. ELECTRICAL CIRCUIT & SIMULATION LAB
BEE-C 352

LIST OF EXPERIMENTS

1. Verification of principle of superposition theorem with A.C. source.
2. Verification of principle of Thevenin's theorem with A.C. source.
3. Verification of principle of Norton's theorem with A.C. source.
4. Verification of principle of maximum power transfer theorem with A.C. source.
5. To study RLC series circuit.
6. To study RLC parallel circuit.
7. Determination of transient response of current in RL and RC circuits.
8. Determination of transient response of current in RLC circuit.
9. Determination of frequency response of current in RLC circuit with sinusoidal A.C. input.
10. To study T and ∏ networks.
11. Determination of z and h parameters (D.C. only) for a network and computation of Y and ABCD parameters.
12. Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values.
13. Verification of parameter properties in inter-connected two port networks: series, parallel and cascade also study loading effect in cascade.
14. Determination of frequency response of a Twin-t notch filter.

Manual of Electrical Circuit & Simulation Lab
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4. ELECTRICAL MACHINES-II LAB
BEE-C461

LIST OF EXPERIMENTS

1. To perform no load and blocked rotor tests on a three phase squirrel cage induction motor and determine equivalent circuit.
2. To perform load test on a three phase induction motor and draw:
(i) Torque -speed characteristics
(ii) Power factor-line current characteristics
3. To perform no load and blocked rotor tests on a single phase induction motor and determine equivalent circuit.
4. To study speed control of three phase slip ring induction motor by varying rotor resistance.
5. To perform open circuit and short circuit tests on a three phase alternator and determine voltage regulation at full load and at unity, 0.8 lagging and leading power factors by (i) EMF method
(ii) MMF method.
6. To determine V-curves and inverted V-curves of a three phase synchronous motor.
7. To determine Xd and Xq of a three phase salient pole synchronous machine using the slip test and draw the power-angle curve.
8. To study the methods of synchronization of an alternator with bus bars.

Manual of Electrical Machines II Lab
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5. POWER ELECTRONICS LAB
BEE-C 462

LIST OF EXPERIMENTS

1. To study the DC voltage trigger with superimposed AC (SCR triggering circuit)
2. SCR trigger by R and R-C phase shift circuit.
3. To study the SCR phase control circuit.
4. To study the Triac phase control circuit.
5. To study the voltage commutated DC Chopper.
6. To study the current commutated DC Chopper.
7. To study the IGBT single-phase Inverter.
8. To study MOSFET single-phase Inverter.

Manual of Power Electronics Lab
> **(Link: https://drive.google.com/file/d/14AK0uCyoO_7ta-k2BcFaZk9DKZQSfSkH/view?usp=sharing)**

6. EMMI LAB
BEE-C 463

LIST OF EXPERIMENTS

1. Calibration of A.C. voltmeter and A.C. ammeter.
2. Measurement of low resistance by Kelvin's double bridge.
3. Measurement of voltage, current and resistance using D.C. potentiometer.
4. Measurement of inductance by Maxwell's bridge.
5. Measurement of inductance by Hay's bridge.
6. Measurement of inductance by Anderson's bridge.
7. Measurement of capacitance by Owen's bridge.
8. Measurement of capacitance by De Sauty bridge.
9. Measurement of capacitance by Schering bridge.
10. Measurement of power and power factor of a single-phase inductive load and to study effect of capacitance connected across the load on the power factor.
11. Measurement of power and power factor of a three-phase load.
12. Measurement of phase difference and frequency of a sinusoidal A.C. voltage using C.R.O.

Manual of EMMI Lab
   (Link:- https://drive.google.com/file/d/1FpmkrXUzjpRIYP9E5KqsQ_-fflH4iFTS/view?usp=sharing)

7. POWER SYSTEMS- I LABORATORY
BEE-C 561

LIST OF EXPERIMENTS

1. To study the performance of a long transmission line under no load & light load conditions.
2. To study phase displacement between the current & voltage at input of line using transmission line trainer kit.
3. Measurement of input impedance and attenuation of transmission line using transmission line trainer kit.
4. Measurement of characteristics of transmission using transmission line trainer kit.
5. To find the resistivity of the earth using a hand driven earth tester.
6. To study the performance characteristics of a typical D.C. distribution system (Radial Configuration).
7. To determine the ABCD parameters of transmission line.
8. To determine the h parameters and Image parameters of transmission line.
i) To plot the equipotential line of paper model of multiple layer cable.
ii) To plot electric stress distribution in a paper model of multiple layer cable.
9. To determine the voltage distribution across a string insulator and calculate string efficiency.
10. To test the breakdown voltage of the transformer oil by transformer oil testing set.

Manual of Power Systems I Laboratory

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8. CONTROL SYSTEMS LABORATORY
BEE-C 562

LIST OF EXPERIMENTS
1. To study potentiometer based error detector and to draw its characteristics.
2. To study speed control and reversal of stepper motor using microprocessor.
3. To study synchro transmitter receiver pair and its operation as an error detector.
4. Study of two phase AC servo motor and draw its speed torque characteristics.
5. To study voltage sensitive bridge and to analyze its sensitivity and linearity.
6. To study D.C. position control system and to execute position control through continuous and step command.
7. To design, implement and study the effects of different cascade compensation networks for a given system.
8. To study the Digital control system and to implement digital PID control for a modeled process.
9. To study relay as nonlinear element and effect of dead-zone and hysteresis on the controlled process.
10. To study speed control of DC Servomotor using PID controller.
11. To study magnetic amplifier and to plot control current versus load current characteristics for series, parallel and self-saturation mode configuration.
12. To study and perform simple two step open loop control and proportional control on process control simulator kit.

Manual of Control System Laboratory

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9. ELECTRICAL DRIVES LABORATORY
BEE-C 563

LIST OF EXPERIMENTS
1. Performance & speed control of D.C. drive using 3-phase full Converter.
2. To perform speed control of separately excited dc motor using chopper
3. Speed control of dc motor using closed loop and open loop.
4. Study and analyze the performance of four quadrant operation of chopper fed dc motor drive at different firing angles
5. Determination of speed and output voltage of 3-phase A.C. Voltage controller fed induction motor drive.
6. Performance & speed control of 3-phase slip ring Induction motor by Static Rotor Resistance controller.
7. DSP based V/F Control of 3-phase Induction motor.
8. DSP based Speed control of BLDC motor
9. Study of Chopper fed DC Drive.
10. Study of AC Single phase motor-speed control using TRIAC.

Manual of Electrical Drives Laboratory

10.   POWER SYSTEMS II LABORATORY
BEE-C 661

LIST OF EXPERIMENTS

1. To develop a computer program to design single phase core type transformer.
2. To develop a computer program to design single phase shell type transformer.
3. To develop a computer program to design three phase core type transformer.
4. To develop a computer program to design three phase shell type transformer.
5. To develop a computer program to design three phase squirrel cage Induction motor.
6. To develop a computer program to design three phase slip ring Induction motor.
7. To develop a computer program to design a D. C. series motor.
8. To develop a computer program to design a synchronous machine.
9. To develop a computer program to design a DC shunt motor.
10. To develop a computer program to design a DC generator.

Manual of Power Systems II Laboratory
> **(Link:- https://drive.google.com/file/d/1MP0yvL8ANOtkGt-g94UN5io7OKAZQqIZ/view?usp=sharing)**

11.COMPUTER AIDED DESIGN OF ELECTRICAL MACHINES LABORATORY
BEE-C663

LIST OF EXPERIMENTS

1. To develop a computer program to design single phase core type transformer.
2. To develop a computer program to design single phase shell type transformer.
3. To develop a computer program to design three phase core type transformer.
4. To develop a computer program to design three phase shell type transformer.
5. To develop a computer program to design three phase squirrel cage Induction motor.
6. To develop a computer program to design three phase slip ring Induction motor.
7. To develop a computer program to design a D. C. series motor.
8. To develop a computer program to design a synchronous machine.
9. To develop a computer program to design a DC shunt motor.
10. To develop a computer program to design a DC generator.

Manual of CAD of Electrical Machines Laboratory

12. SWITCHGEAR AND PROTECTION LABORATORY
BEE-C 761

LIST OF EXPERIMENTS

1. To study the construction of under voltage relay and draw it's time vs. voltage characteristics.
2. To study the construction of over voltage relay and draw the following characteristics
(a) Operating current & de-operating voltage of disc.
(b) Voltage & operating time.
3. To study the construction of thermal relay and determine
(a) Operational characteristics of the relay.
(b) Time current characteristics of given fuse.
4. To study the construction of I.D.M.T. relay and determine
(a) Operational characteristics of the relay for two time & current setting.
(b) Reset ratio.
5. To study the construction of instantaneous over current relay and draw the following characteristics
(a) Operating & de-operating current of the relay.
(b) Current vs. time characteristics.
6. To study the construction of earth fault relay and determine operational characteristics of the relay for time & current setting.
7. To study the construction of percentage differential relay and determine
(a) Operational characteristics of the relay.
(b) Percentage bias & minimum operating current.
8. To study the different parts of Circuit Breaker.
9. To study performance of the different types of fuses.
10. To study performance of miniature circuit breaker (MCB).

**Manual of Switchgear & Protection Lab
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13. CAD OF POWER SYSTEM LAB
BEE-C 752

LIST OF EXPERIMENTS

1. To develop a computer program for Y-bus.
2. To develop a computer program for Z-bus.
3. To develop a computer program for Gauss-Seidal method.
4. To develop a computer program for Newton-Raphson method.
5. To develop a computer program to analyze symmetrical short circuit fault.
6. To develop a computer program to analyze L-G faults.
7. To develop a program for L-L fault in the power transmission line.
8. To develop a program to simulate the L-L-L fault.
9. Study of computer aided power system stability.
10. To calculate the transmission line parameters using any computer language.

Manual of CAD of Power System Lab