

LIST OF EXPERIMENTAL SETUP

BTEE-305 (Semi-conductor Devices and Circuit Theory)

List of Experiments:

1. Measurement of resistance of elements
2. Phasor analysis of RL, RC and RLC circuits in series and in parallel
3. Frequency response of resonant circuits
4. Transients in RL, RC, and RLC Circuits
5. To verify Superposition theorem.
6. To verify Norton's theorem.
7. To verify Thevenin's theorem.
8. To verify maximum power transfer theorem.
9. To study the response of low pass and high pass filters.
10. To study the response of constant K-filters.
11. To study the response of m-derived filters
12. Two-port networks; network parameters and equivalent circuit
13. To draw V-I characteristics of PN junction diode (Ge, Si, switching and signal).
14. To design half wave rectifier.
15. To design full wave and bridge rectifiers.
16. Diode clippers and clampers.
17. To study transistor characteristics in common base and common emitter configurations.
18. To study the FET characteristics.
19. To design, study and compare various transistor biasing techniques.
20. To design regulated power supply using Zener diode/ voltage regulator IC.
21. To study of an emitter follower circuit.

BTEE-306 (Electrical Machines-I)

List of Experiments:

- 1.** To Load test on a single phase transformer.
- 2.** To perform Open circuit and short circuit tests on a single phase transformer and hence find equivalent circuit, voltage regulation and efficiency.
- 3.** To find the efficiency and voltage regulation of single phase transformer under different loading conditions.
- 4.** To perform parallel operation of two single phase transformers.
- 5.** To study the various connections of three phase transformer.
- 6.** . To perform Scott connections on three phase transformer to get two phase supply.
- 7.** To study the constructional details of direct current (DC) machine and to draw sketches of different components.
- 8.** To measure armature and field resistance of direct current (DC) shunt generator and to obtain its open circuit characteristics.
- 9.** To obtain load characteristics of direct current (DC) shunt/series /compound generator.
- 10.** To draw speed-torque characteristics of direct current (DC) shunt/series /compound generator.
- 11.** To study direct current (DC) motor starters.
- 12.** To perform Swinburne's test (no load test) to determine losses of direct current (DC) shunt motor.

BTEE-307 (Measurements)

List of Experiments:

1. Study of principle of operation of various types of electromechanical measuring instruments.
2. a) To measure High value of DC current by a Low Range DC Ammeter and Shunt
b) To measure High value of DC voltage by a Low Range DC Voltmeter and Multiplier
3. a. To measure High value of AC Current by a Low Range AC Ammeter and Current Transformer.
b. To measure High value of AC Voltage by Low Range Voltmeter and Potential Transformer
4. Measurement of resistance using Wheatstone Bridge.
5. To measure active and reactive power in 3 phase balanced load by one wattmeter method.
6. To measure the active power in three phase balanced and unbalanced load by two wattmeter method and observe the effect of power factor variation on wattmeter reading.
7. To calibrate and use the Induction Energy Meter.
8. Measurement of resistance using Kelvin's Bridge.
9. Measurement of self inductance using Anderson's Bridge.
10. Measurement of capacitance using Schering Bridge.
11. Plotting of Hysteresis loop for a magnetic material using flux meter.
12. Measurement of frequency using Wien's Bridge.
13. To study the connections and use of Current and potential transformers and to find out ratio error.
14. Determination of frequency and phase angle using CRO.
15. Measurement of unknown voltage using potentiometer.
16. To find 'Q' of an inductance coil and verify its value using Q- meter.

BTEE-407 (Instrumentation & Measuring Devices)

List of Experiments:

1. To study the input-output characteristics of a potentiometer and to use a potentiometer as an error detector.
2. To measure Insulation Resistance by Megger.
3. To measure earth resistance by Earth Tester.
4. To observe phase sequence of three phase circuit using Rotating type Phase Sequence Indicator.
5. To measure frequency of A.C. supply using Weston Frequency Meter.
6. To measure power factor of single phase and three phase load by PF Meter and verifying through current, voltage and power measurement.
7. To measure circuit parameters and three phase load by PF Meter by LCR Meter.
8. Measurement of displacement using LVDT.
9. Temperature measurement using temperature sensor (RTD).
10. Light measurement using LDR and photo cell sensor.
11. Water level measurement using capacitance transducer of a Liquid in a Tank
12. Velocity measurement using air flow transducer.
13. RPM measurement using electromagnetic transducers.
14. Study of the characteristics of a Piezoresistive Sensor for Pressure Measurement of a Liquid in a Tank
15. Study of the characteristics of Resistance Temperature Detector(RTD)
16. Study of the characteristics of a Thermistor
17. Study of the characteristics of a Thermocouple
18. Study of the characteristics of an Electromagnetic Flowmeter
19. Study of the characteristics of a Tachometer
20. Study of the characteristics of a Photo reflective sensor for Speed Measurement

BTEE-408 (Control System)

List of Experiments:

1. To study the characteristics of potentiometers and to use 2- potentiometers as an error detector in a control system.
2. To study the synchro Transmitter-Receiver set and to use it as an error detector
3. To study the Speed – Torque characteristics of an AC Servo Motor and to explore its applications.
4. To study the Speed – Torque characteristics of an DC Servo Motor and explore its applications.
5. To study various electro-mechanical transducers i.e. resistive, capacitive and inductive transducers
6. To study a LVDT (AC-AC, DC-DC) as a transducer and its processing circuits
7. To study the characteristics of a thermocouple, a thermistor and a RTD
8. To study photo-conductive cell, semi-conductor photodiode and a silicon photo voltaic cell
9. To study a silicon phototransistor and obtain response of photo conductive cell
10. To study the variations of time lag by changing the time constant using control engineering trainer
11. To simulate a third order differential equations using an analog computer and calculate time response specifications
12. To obtain the transfer function of a D.C. motor – D.C. Generator set using Transfer Function Trainer
13. To study the speed control of an A.C. Servo Motor using a closed loop and an open loop systems
14. (i) To study the operation of a position sensor and study the conversion of position in to corresponding voltage
(ii) To study an PI control action and show its usefulness for minimizing steady state error of time response.
15. To measure Force / Displacement using Strain Gauge in a wheat stone bridge
16. To design a Lag compensator and test its performance characteristics.
17. To design a Lead-compensator and test its performance characteristics.
18. To design a Lead-Lag compensator and test its performance characteristics.

BTEC-409 (Electronic Circuits)

List of Experiments:

1. To design a voltage regulator using zener diode and also see the effect of line and load regulation
2. To design various clippers and clampers using diodes.
3. To obtain the frequency response of an amplifier and calculate the gain bandwidth of the amplifier.
4. To investigate the emitter follower (Buffer) amplifier and determine A_V, R_i, R_O
5. To study the characteristics of a class B amplifier and also calculate the overall efficiency.
6. To study the characteristics of a class AB amplifier.
7. To study the characteristics symmetry amplifier.
8. To design and study various type of oscillators and to determine the frequency of oscillations.
9. To design a transistor series voltage regulator with current limits and observes current feedback characteristics.
10. To study the characteristics of a complementary symmetry amplifier.
11. Application of Op-Amp(741) as inverting and non-inverting amplifier.
12. To use the OP-AMP as summing, scaling and averaging amplifier.
13. Design differentiator and integrator using OP-AMP and also determine the time constant and cut-off frequency.
14. Application of OP-AMP as Schmitt Trigger.
15. Design a delay circuit using 555 timer and study the monostable, bistable and astable operations using 555.
16. a) Verification of the truth tables of TTL gates viz; 7400,7402, 7404, 7408,7432,7486.
b) Design and fabrication and realization of all gates using NAND/NOR gates.
17. Verification of truth table of Multiplexer(74150)/Demultiplexer(74154)
18. Design and verification of truth tables of half-adder, full-adder and subtractor circuits using gates 7483 and 7486(controlled inverter).
19. To study the operation of Arithmetic Logic Unit IC 74181.
20. Design fabrication and testing of
 - a) Monostable multivibrator of $t = 0.1\text{ms}$ approx. using 74121/123.testing for both positive and negative edge triggering, variation in pulse width and retriggering.
 - b) Free running mutivibrator at 1KHz and 1Hz using 555 with 50% duty cycle. Verify the timing from theoretical calculations.
21. Design and test S-R flip-flop using NOR/NAND gates.
22. Design, fabricate and test a switch debouncer using 7400.
23. Verify the truth table of a JK flip flop using IC 7476,
24. Verify the truth table of a D flip flop using IC 7474 and study its operation in the toggle and asynchronous mode.
25. Operate the counters 7490, 7493 and 74193(Up/Down counting mode). Verify the frequency division at each stage. Using a frequency clock (say 1 Hz) display the count of LED's.

- 26.** Verify the truth table of decoder driver 7447/7448. Hence operate a 7 segment LED display through a counter using a low frequency clock. Repeat the above with the BCD to Decimal decoder 7442.

BTEE-506 (ELECTRICAL MACHINES-II)

List of Experiments:

1. To perform load-test on three-phase Induction motor and to plot torque versus speed characteristics.
2. To perform no-load and blocked-rotor tests on three-phase Induction motor to obtain equivalent circuit. Parameters and to draw circle diagram.
3. To study the speed control of three-phase Induction motor by Kramer's Concept.
4. To study the speed control of three-phase Induction motor by cascading of two induction motors, i.e. by feeding the slip power of one motor into the other motor.
5. To study star- delta starters physically and a) to draw electrical connection diagram b) to start the three-phase Induction motor using it. c) to reverse the direction of three-phase Induction motor
6. To start a three-phase slip -ring induction motor by inserting different levels of resistance in the rotor ckt. And to plot torque -speed characteristics.
7. To perform no-load and blocked-rotor test on single-phase Induction motor and to determine the parameters of equivalent ckt. Drawn on the basis of double revolving field theory.
8. To perform load -test on single-phase. Induction motor and plot torque -speed characteristics.
9. To perform no load and short circuit. Test on three-phase alternator and draw open and short circuit characteristics.
10. To find voltage regulation of an alternator by zero power factor (ZPF.) method.
11. To study effect of variation of field current upon the stator current and power factor with synchronous motor running at no load and draw Voltage and inverted Voltage curves of motor.
12. To measure negative sequence and zero sequence reactance of Synchronous Machines.
13. Parallel operation of three phase alternators using • Dark lamp method • Two-Bright and one dark lamp method
14. To study synchroscope physically and parallel operation of three-phase alternators using synchroscope.
15. Starting of synchronous motors using • Auxiliary motor • Using Damper windings

BTEE-507 (NUMERICAL ANALYSIS)

List of Experiments:

To Develop algorithms/programs in C or C++ or FORTRAN-77/90/95 or MatLab language for the following methods

1. Lagrange's formula with error, divided difference for interpolation,
2. Newton's divided difference method for interpolation and extrapolation.
3. Bisection method for finding a real root of an equation.
4. Newton Raphson method for finding a real root of an equation.
5. Iteration method for finding a real root of an equation.
6. Gauss elimination method for solving simultaneous linear algebraic equations.
7. Gauss Jordan method for solving simultaneous linear algebraic equations.
8. Simpson's 1/3rd rule for numerical integration.
9. Newton's forward interpolation formula.
10. Lagrange's method for interpolation.
11. Euler's method for solving ordinary differential equations.
12. Runge-Kutta (up to fourth order) method for solving ordinary differential equations.
13. Curve fitting (linear and polynomial)

BTEE-508 (ELECTRICAL: ESTIMATION AND COSTING)

List of Experiments:

1. To study Indian electricity rules
2. To carryout wiring diagram of residential building, Educational institute and Industry. Giving selection of appropriate wiring, list materials and accessories for given project.
3. To study the design consideration of Panel Boards.
4. To study the design consideration of various electrical systems: a. 3 phase four wire distribution systems b. Earthing
5. To estimate the cost of a domestic installation (Residential building, laboratory room or Drawing hall etc) with concept of illumination design. TERI (The Energy Research Institute) recommendations on lighting schemes
6. To estimate the cost of industrial installation (Work shop, agriculture, flour mill etc).
7. To estimate the cost of overhead service connection (Single phase and three phase).
8. To estimate the cost of underground service connection (single phase and three phase).
9. To estimate the cost of overhead, 440 V, 3-phase, 4 wire or 3 wire distribution line.
10. To estimate the cost of underground, distribution line.
11. To estimate the cost of any one electrical appliance.
12. To estimate the cost of repairs and maintenance of any one domestic appliance.
13. To study various types of light sources and lighting schemes.
14. To make wiring diagrams of motor control circuits for starting of a. 3 phase induction motor b. Wound Motor c. Synchronous motor

BTEE-606 (Power Electronics and Drives)

List of Experiments:

- 1.** To study principle of operation of SCR, plot V-I characteristics and study the effect of gate triggering on turning on of SCR.
- 2.** To draw V-I characteristics of an UJT and to use UJT as relaxation oscillator.
- 3.** To study the effect of free-wheeling diode on power factor for single phase half-wave rectifier with R-L load.
- 4.** To plot waveforms for output voltage and current, for single phase full-wave, fully controlled bridge rectifier, for resistive and resistive cum inductive loads.
- 5.** Study of the microprocessor based firing control of a bridge converter.
- 6.** To study three phase fully controlled bridge converter and plot waveforms of output voltage, for different firing angles.
- 7.** Study of Jones chopper or any chopper circuit to check the performance.
- 8.** Thyristorised speed control of a D.C. Motor.
- 9.** Speed Control of induction motor using thyristors.
- 10.** Study of series inverter circuit and to check its performance.
- 11.** Study of a single-phase cycloconverter.
- 12.** To check the performance of a McMurray half-bridge inverter

BTEE-607 (Power System-II)

List of Experiments:

- 1.** To study the performance of a transmission line. Also compute its ABCD parameters.
- 2.** Study of Characteristics of over current and earth fault protection.
- 3.** To study the operating characteristics of fuse. (HRC or open type)
- 4.** To find the earth resistance using three spikes
- 5.** To study over current static relay.
- 6.** To study the different types of faults on transmission line demonstration panel/model.
- 7.** To study the radial feeder performance when a. Fed at one end b. Fed at both ends
- 8.** To study the performance of under voltage and over voltage relay.
- 9.** To study the characteristics of bimetal mini circuit breakers.
- 10.** To study the characteristics of Distance Relay.
- 11.** To find the breakdown strength of transformer oil.

BTEC-608 (Micro controller and PLC)

List of Experiments:

1. Study of 8051/8031 Micro-controller kits.
2. Write a program to add two numbers lying at two memory locations and display the result.
3. Write a program for multiplication of two numbers lying at memory location and display the result.
4. Write a program to check a number for being ODD or EVEN and show the result on display.
5. Write a program to split a byte in two nibbles and show the two nibbles on display.
6. Write a program to arrange TEN numbers stored in memory location in ascending and descending order.
7. Write a program to find a factorial of a given number.
8. Study of interrupt structure of 8051/8031 micro-controllers.
9. Write a program to show the use of INT0 and INT1.
10. Write a program of flashing LED connected to port 1 of the micro-controller.
11. Write a program to control a stepper motor in direction, speed and number of steps.
12. Write a program to control the speed of DC motor.
13. Implementation of different gates using PLC.
14. Implementation of DOL and star delta starter using PLC.
15. Implement basic logic operations, motor start and stop operation using (i) Timers
(ii) Counters
16. Motor forward and reverse direction control using PLC.
17. Write and implement the LD control program for rack feeder.
18. Make a PLC based system for separating and fetching work pieces.
19. Make a PLC based control system for conveyor belt.
20. Implement a PLC based traffic light control.

EE-408 (C.A.P.S.A. LAB.)

List of Experiments:

1. Developing a Single line Diagram of a Power System Using Computer Software.
2. Developing Algorithms/Flowcharts/Computer programmes for :
 - I. Load Flow Studies using
 - (a) Gauss Siedel Method
 - (b) Newton Raphson's Method
 - (c) Fast Decoupled Method
 - II. Short Circuit Studies for
 - (a) Symmetrical Faults
 - (b) Line to Ground Fault
 - (c) Line to Line Faults etc.
 - III Swing Equation for transient Stability Studies
 - IV. Economic Load Despatch.

EE-41(Power Systems Design Lab.)

List of Experiments:

1. Design of transmission systems for given power and distance.
2. Short circuit calculations and calculations of circuit breaker ratings for a power system network.
3. Design of substations
4. Design of distribution systems.

EE-412 SEMINAR

Students will be required to prepare a report on a given topic related to latest developments in electrical engineering and deliver a seminar on that topic.

EE-414 PROJECT WORK

Design, Fabrication, Simulation, Evaluation, Testing etc. of any Electrical equipment, system is to be carried out under the supervision of guide(s).