

Programme : Diploma in Metallurgy Engg
Semester : III
Subject : Electrical & Electronics Engineering
Subject Code : MET 303

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Section A : Electrical Engg

FM 100 (80 + 20) Theory
FM 50 (40+10) Practical
Hrs 42 Th

AC Fundamentals:

03 hours

cycle, frequency, phase, period, max, average, r.m.s. value. Concept of current, voltage, power & energy in R, L, & C circuits Three phase supply: Star & Delta circuit, Line & Phase relationship, power equation.

Measuring Instruments:

02 hours

Introduction to construction, operation and use of AC & DC ammeter, voltmeter, Wattmeter, energy meter & digital multimeter'

DC Motor:

02 hours

Construction and principle of operation. Speed torque characteristics. Types, specifications & ratings and applications. Types of insulation used.

Transformer:

02 hours

Construction and principle of operation. EMF equation and transformation ratio. Load test, efficiency and regulation. Specifications & rating. Auto transformer & 3 phase transformer concept only. Applications of transformers.

AC Machines:

05 hours

Construction and principle of operation of single and three phase induction motor. Speed torque characteristics, slip, speed control (VFD), reversal of rotation, starters. Single phase motor, universal motor, stepper motor & servo motor. Motor specification & ratings. Applications of these motors in various fields. Testing of motors.

Synchronous Motor- Construction, principle of operation, methods of starting & applications.

Utilisation of Electrical Energy :

04 hours

Industrial applications: Classification of drives, factors for selection of motor for different drives, Enclosures & Mountings

Electric heating & welding: Working principle & types selection of system, specifications & rating

Electric wiring & Illumination:

02 hours

Principles of wiring, Simple Electric Installations with 2 sockets, 2 fans, 2 lamps, fuses. Introduction to different accessories like MCCB, ELCB, wires & cables. Different types of lamps their specifications

Electric safety:**02 hours**

Tariff & power conservation, necessity of Earthing, types safety tools, first aid measures, types of tariff, pf improvement only methods, energy conservation & audit, fire extinguishing methods adopted in electrical engineering.

B: Electronics Engineering :**Electronic Devices :****04 hours**

Conductor, Insulator and Semiconductor. P and N Type Semiconductor, PN Junction. principle of working and testing procedure – Diode, Zener diode, Power diode, Varactor diode, Half wave, full wave & bridge rectifier. Filters – L, C, L-C, π filter Concept of unregulated power supply, regulated power supply- line regulation & load regulation.

Transistor :**05 hours**

Bipolar Junction Transistor (BJT), Transistor as a switch and amplifier, single stage transistor amplifier CB, CE and CC configuration and their applications, Biasing, RC coupled and direct coupled amplifier, their frequency response and application.

Field Effect Transistor(FET) – Introduction to JFET & MOSFET, VI characteristics

Special Devices :**04 hours**

Uni-junction Transistor(UJT), power devices – DIAC, TRIAC, SCR, Photo devices-, LDR, Photo diode, Photo transistor, LED & LED display (7 segment), Liquid crystal display(LCD), opto –coupler, thermister-NTC,PTC

OP Amp:**02 hours**

Block diagram, configurations and use of op amp as - Inverting, Non inverting, Summing, Voltage to current converter, current to voltage converter, differentiator, Comparator, Wien bridge oscillator, Schmitt's trigger, Instrument amplifier

Digital Electronics :**05 hours**

Number system- Decimal, Binary, Hexadecimal, BCD, Decimal to binary conversion, Decimal – Hexadecimal conversion.

Study of logic gates, Symbol, truth table and IC numbers - NOT, AND, OR, NAND, NOR, XOR, XNOR and NAND as universal gate.

Flip Flops – Block diagram of flip flop, RS flip flop, D flip flop ,Toggle , JK flip flop, Master Slave JK flip flop, Clocked flip flop – level triggered and edge triggered , Application of flip flop Frequency divider, Ring counter, Shift register.

Subject : Electrical & Electronics Engineering**Subject Code : MET 307****Practical's (Minimum 10 experiments taking 5 from each is to be performed by students)****A) List of Electrical Engineering Practical:**

- 1) For a given resistive & inductive series & parallel circuit, select ammeter, voltmeter & wattmeter. Make the connections and measure current, voltage and power drawn by the circuit. Measure it by clip on meter & compare it.
- 2) For a given DC Shunt/Series motor, select suitable meters, make connections as per diagram, check the connections and run the motor. Take the meter readings to draw speed torque characteristics. Make suitable changes in the connections to reverse the direction of rotation.
- 3) For the above given motor prepare a circuit to control its speed above & below normal, plot its graph.
- 4) List specifications of given single phase transformer. Perform no load test on the transformer to find transformation ratio.
- 5) Connect an electronic energy meter to a load, take reading & prepare energy consumption bill with present tariff structure
- 6) Prepare actual wiring on a board to study and operate one lamp controlled by one switch, staircase wiring, go down wiring using casing capping.
- 7) Observe Electric wiring of main building in your campus list the accessories used and draw a general layout
- 8) Observe earthing of your laboratory, measure its resistance & list its significance
- 9) Prepare a simple electric wiring circuit comprising of 2lamps, 2 sockets, 1 fan with a fuse & check it.
- 10) Prepare trouble-shooting chart of above motors and identify the faults of a motor or a transformer

B) List of Electronics Engineering Experiments:

1. Use of multi meter (analog and digital) for current, voltage and resistance measurement (Use of colour code for resistors also).
2. Study of front panel of CRO and measurement of frequency and voltage.
3. PN Junction VI Characteristics & Zener Diode working and rectification
4. Measurement of L, C, R on LCR meter
5. CE Configuration Characteristics
6. Transistor biasing and as amplifier with frequency response
7. Testing of components like diode, FET, MOSFET, LED, SCR, diac, triac, Zener diode, inductor, capacitor using a multi meter
8. To plot the frequency response of single stage DC / RC coupled amplifier and calculate band width.
9. Verification of Op-Amp as inverting and non inverting amplifier and use as adder etc.
10. Verify truth tables for logic gates- . NOT, AND, OR, NAND, NOR, XOR, XNOR

Reference Books :

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|------------------------------|-----------------|
| 1. Electrical Technology | B L Theraja |
| 2. Electrical Technology | H Cotton |
| 3. Electronic Principles | A P Malvino |
| 4. Digital Electronics | Malvino & Leach |
| 5. Linear Integrated Circuit | Gaikwad |