LEVEL-III COURSES

3061 - ELEMENTS OF ELECTRICAL ENGINEERING

Teaching Schedule Per Week			Progressive Assessment	Examination Schedule (Marks)			
				Theory		Practical Ex.	Total
Lectures	Practical	Credits					
3	2	5	50	3 Hrs	100	-	150

Pre-requisite	Source
Nil	ELI.

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	25	-	125

RATIONALE: This course will acquaint a student with the parts of each machine, their functions and the specifications of each machine for procurement. The student gets familiarised with the various types of distribution systems, earthing as well as the switching and protective devices with respect to their parts and specifications during procurement.

COURSE CONTENTS	Hrs.	Mks
1. DISTRIBUTION OF ELECTRIC POWER Various types of distribution systems – Three phase, single phase, their advantages, disadvantages & suitable applications, underground distribution system, comparative advantages & disadvantages over the over head distribution system. General construction, specifications of PVC insulated power cable with respect to its standard size and current carrying capacity, factors affecting the current, carrying capacity, colour code for identification of insulated conductors.	8	16
2. WIRING Various wiring systems (cleat, casing & capping, conduit wiring only) their comparison and suitable applications. I.E. rules relevant to wiring installation for light, fan and power wiring (including industrial). Testing of wiring installation. Estimation of energy bill for industrial installation.	8	16
3. EARTHING Purpose of earthing, types. (Installation of earthing only). Method for reducing earth resistance. I.E. rules relevant to earthing.	4	8
4. TRANSFORMERS Main parts and their functions, working terms related to transformer such as step up, step down, primary, secondary, H.V, L.V efficiency and regulation, E.M.F. equation (no derivation & no problem), current ratio and voltage ratio, specifications of transformer for procurement and applications.	5	12
5. D. C. MOTORS Main parts and their functions, working of motor, classification, expression for speed, types of working characteristics, starting, reversal of direction of rotation. Efficiency (no derivation & no problem) types of starters used and their comparison, applications.	5	12
6. A. C. MOTORS Induction motor – 3 phase, main parts and their functions, working characteristics, efficiency (no derivation & no problem). Classification and their application, methods of starting and their comparative study. Methods of reversal of direction of rotation, specifications for procurement. Single phase Induction motor: -Main parts, and their functions, working, classification and their applications, method of reversal of direction of rotation (DOR). Efficiency (no derivation & no problem), specifications for procurement. Single-phase commutator-motor: -Parts, working and mechanical characteristics, classification and their application, specifications for procurement.	10	20

7. SWITCHING AND PROTECTIVE DEVICES (For industrial purposes). Switch fuse unit, fuse switch unit, contactors, MCB, MCCB, ELCB (with respect to their advantages disadvantages & specifications for procurements). Fuses and their types. Control devices for Industrial purposes. Relays, time delay relays, over current relays. Limits switches, reversing switch.	8	16
Total	48	100

TERM WORK

The term work shall consist of conducting the following experiments in the laboratory and completion of assignments: -

1. Identification of switches, switch fuse and fuse switch units, MCB, MCCB, ELCB.
2. Fuse and replacement of fuse wire in switch fuse unit and HRC fuse in fuse switch unit.
3. Estimation of energy bill for a given load and its operation schedule.
4. Testing of electrical devices for existence of O.C., S.C. and continuity by using Series lamp test, Multi-meter separately.
5. Starting of single phase, as well as D.C. motor and reversal of their direction of rotation.
6. Study of various wiring materials such as supports, switch, socket, ceiling rose, lamp-holders.
7. Connections of a transformer and measurement of input & output quantities (V, I and W)
8. Starting of 3 phase Induction motors using various starters – Star-delta, and DOL starter in case of 3-phase squirrel cage induction motor, Auto transformer starter in case of 3-phase squirrel cage Induction motor and Rotor rheostat starter in case of 3-phase wound rotor type Induction motor, and their reversal of directions of rotation.
9. Study of various lamps used for lighting i.e. Incandescent lamp, fluorescent lamp, mercury vapour lamp (HPMV) and sodium vapour lamp (HPSV) w.r.t. identification, colour of light & efficacy (Lumens/watt).

REFERENCE BOOKS

1. Electrical Engg. Hand Book by S.L. Bhatia
2. Electrical Technical by B. L. Theraja