



DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

VI SEMESTER

2015 – 2016 onwards

DISTRIBUTION AND UTILIZATION

CURRICULUM DEVELOPMENT CENTRE

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

M - SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 33061

Semester : VI Semester

Subject Title : **DISTRIBUTION AND UTILIZATION**

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Subject	Instruction		Examination			Duration
	Hours/Week	Hours/Semester	Marks			
DISTRIBUTION AND UTILIZATION	6	90	Internal Assessment	Board Examination	Total	3 hrs
			25	75	100	

TOPICS AND ALLOCATION OF HOURS

UNIT	TOPIC	TIME (Hours)
I	Distribution	18
II	Industrial Drives	15
III	Electric Traction	16
IV	Illumination	17
V	Electric Heating And Welding	16
	Revision and Test	08
	Total	90

RATIONALE

Distribution system is that part of power system which distributes power to the consumers for utilization. So to have adequate knowledge in distribution and utilization of Electrical energy it becomes necessary to include this subject.

OBJECTIVES

To Understand

- Substation arrangements.
- Distribution -classification and scheme of connection.
- Drives-Suitability for different applications.
- Track Electrification-Traction mechanics.
- Traction motors and control.
- Illumination -Design of lighting scheme-sources of light.
- Electric Heating- Different methods.
- Electric furnaces and Temperature control.
- Electric welding and welding equipments.

DETAILED SYALLABUS

CONTENTS

UNIT	NAME OF THE TOPICS	HOURS
I	<p>DISTRIBUTION</p> <p>Substation: Introduction-Sub stations-classification of sub stations-Indoor and outdoor S.S – Gas insulated S.S-comparisons-Layout 110/11KV Substation and 11KV/400V Distribution Substation-substation equipments-Bus bar- Types of bus bar arrangement -Advantages and Disadvantages.</p> <p>Distribution: Distribution system-Requirements of a Distribution system-part of Distribution system- classification of Distribution systems-comparison of different distribution systems (A.C and D.C) -A.C Distribution -Types-connection schemes of Distribution system-A. C Distribution calculations-Calculation of voltage at load points on single phase distribution systems (With concentrated load only)- Distribution fed at one end, both ends and ring mains-problems- Three phase, four wire, Star connected unbalanced load circuit- Problems- consequence of Disconnection of Neutral in three phase four wire system (illustration with an example)</p>	18
II	<p>INDUSTRIAL DRIVES</p> <p>Introduction-Electric drive- Advantages-parts of Electric drives-Transmission of power-Types of Electric drives-Individual, group and multi motor drives – Advantages and disadvantages of Individual and group drive -Factors governing the selection of motors-Nature and classification of load Torque-Matching of speed Torque characteristics of load and motor-Standard ratings of motor- classes of load duty cycles-Selection of motors for different duty cycles-Selection of motors for specific application-Braking- Features of good braking system- Types of Braking- Advantages of- Electric braking-Plugging, Dynamic and Regenerative braking-As applied to various motors.</p>	15
III	<p>ELECTRIC TRACTION</p> <p>Introduction-Traction systems-Advantages and Disadvantages of Electric Traction.</p> <p>System of Track Electrification: Methods of supplying power-Rail connected system and over head system-O.H. equipments-contact wire, centenary and droppers-</p>	16

	<p>current collection gear for OHE-Bow and pantograph collector-Different systems of Track Electrification-Advantages of single phase low frequency A. C. system-Booster Transformer-Necessity- Methods of connecting B.T-Neutral sectioning.</p> <p>Traction Mechanics:</p> <p>Units and notations used in Traction mechanics-Speed time curve for different services - simplified speed time curve-Derivation of maximum speed-crest speed, Average speed, Schedule speed (definitions only)-Tractive effort and power requirement- Specific energy output- specific energy consumption.</p> <p>Traction motors and control:</p> <p>Desirable characteristics of Traction motors-Motors used for Traction purpose-Methods of starting and speed control of D.C Traction motors-Rheostatic Control-energy saving with plain rheostatic control series- parallel control- Energy saving with series parallel starting - Shunt Transition -Bridge-Transition- multiple unit control –Regenerative braking.</p> <p>Recent trends in Electric Traction-Magnetic Levitation (MEGLEV) - Suspension systems.</p>	
IV	<p>ILLUMINATION</p> <p>Introduction - Definition and units of different terms used in illumination-plane Angle, Solids angle, Light, Luminous flux, Luminous Intensity, Luminous Efficacy candle power, Lumen, Illumination,M.S.C.P, M.H.C.P, M.H.S.C.P- Reduction factor, Luminance, glare Lamp efficiency. Space-height ratio, Depreciation factor Utilization factor, waste light factor, Absorption factor, Beam factor, Reflection factor- Requirements of good lighting system- Laws of Illumination-problems. Types of lighting scheme- Factors to be considered while designing lighting scheme- Design of lighting Scheme (Indoor and outdoor)- Problems- Lighting systems- Factory lighting, Flood lighting, Street lighting.</p> <p>Sources of light-Arc lamp, Incandescent lamp, Halogen Lamp, Sodium vapour lamp, High pressure mercury vapour lamp, Fluorescent Tube –Induction Lamp- Energy saving lamps (C.F.L and L.E.D lamps)-limitation and disposal of C.F.L-benefits of led lamps-comparison of lumen output for led CFL and incandescent lamp.</p>	17

V	<p>ELECTRIC HEATING AND WELDING</p> <p>Electric Heating: Introduction -Advantages of Electric heating-modes of heat transfer- classification of Electric Heating - Power frequency electric heating- Direct and Indirect resistance heating-Infrared heating-Arc heating –High frequency Electric heating- Induction heating-Induction Stove –Eddy current heating and Dielectric heating.</p> <p>Electric furnaces: Resistance furnace-Requirements of Heating elements-commonly used heating element materials-Resistance furnace for special purposes-Temperature control of resistance furnace-Arc furnace -Direct and Indirect Arc furnace- Temperature control of Arc furnace-Reasons for employing low voltage and high current supply - Induction furnace-Direct and Indirect core type Induction furnace-coreless Induction furnace-Power supply for coreless Induction furnace.</p> <p>Electric welding: Introduction-Types of Electric welding-Requirements of good weld- Preparation of work -Resistance welding- Butt welding, Spot welding, Seam welding, Projection welding and Flash welding-Arc welding-Carbon Arc welding, metal Arc welding, Atomic hydrogen Arc welding, Inert gas metal arc welding-Comparison between Resistance and Arc welding. Radiation welding - Ultrasonic welding, Electron beam welding, LASER beam welding-Electric welding equipments (A.C. and D.C).</p>	16
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TEXT BOOK

S.No	Name of the Book	Author	Publisher
1	A Course in Electrical Power	Soni & Gupta	Dhanpat Rai & Sons, Delhi

REFERENCE BOOKS

S.No	Name of the Book	Author	Publisher
1.	Electric Power	SL Uppal	Khanna Publishers, New Delhi
2.	Modern Electric Traction	H Partab	Dhanpat Rai & Sons, New Delhi
3.	Electrical Power Distribution System	AS Pabla	Tata McGraw Hill Publishing Co, New Delhi
4.	Utilization of Electric Power	NV Suryanarayana	Tata McGraw Hill Publishing Co, New Delhi