COURSE CONTENTS:

1. CONTROL OF ELECTRICAL MOTORS - 2 WEEKS

THEORY (2 HRS)	PRACTICAL (6 HRS)
• INTRODUCTION TO MOTOR CONTROLS • FAMILIARIZATION WITH ELECTRICAL CONTROL ELEMENTS- PUSH BUTTONS, CONTACTORS, OVER LOAD RELAYS, MCB, TIMERS, RELAYS ETC • LOGIC FUNCTIONS IN ELECTRICAL CONTROLS • MOTORS: TYPES, CONSTRUCTION, WORKING PRINCIPLE, SPEED CONTROL, APPLICATIONS OF SQUIRREL CAGE INDUCTION MOTOR 2 SPEED INDUCTION MOTOR SLIP RING INDUCTION MOTOR SYNCHRONOUS MOTORS DC MOTORS SINGLE PHASE MOTOR • POWER & CONTROL CIRCUITS • STARTER CIRCUITS • PLUGGING & DYNAMIC BRAKING OF 3 PHASE SQUIRREL CAGE INDUCTION MOTOR • LOGICAL CONTROL OF MOTORS • INTRODUCTION TO PLC	• FAMILIARIZATION WITH ELECTRICAL CONTROL ELEMENTS • LOGIC FUNCTIONS IN ELECTRICAL CONTROLS • INCHING OPERATION OF 3 PHASE SQUIRREL CAGE INDUCTION MOTOR • DOL STARTER • FORWARD / REVERSE STARTER • MANUAL STAR-DELTA STARTER • SEMI-AUTOMATIC STAR-DELTA STARTER • FULLY AUTOMATIC STAR-DELTA STARTER • TIME DELAY CIRCUITS • SEQUENTIAL CONTROL OF MOTORS • STARTING & RUNNING OF 3 PHASE SYNCHRONOUS MOTOR • CONTROL OF MOTORS USING AC/DC DRIVES

2 MAINTENANCE OF MOTORS, POWER TRANSFORMERS & THEIR CONTROLS

THEORY (2 HRS)	PRACTICAL (6 HRS)
• INTRODUCTION TO MAINTENANCE & TYPES • TYPES OF MOTORS • MAINTENANCE OF MOTORS • MAINTENANCE OF SWITCH GEARS • ELECTRICAL POWER SUPPLY PROBLEMS • POWER FACTOR & ITS IMPROVEMENT • ENERGY CONSERVATION • EARTHING • CONSTRUCTION OF POWER TRANSFORMERS & THEIR TYPES • LOSSES IN TRANSFORMERS & EFFICIENCY • VECTOR GROUPING OF TRASFORMERS • INSTRUMENT TRANSFORMERS • MAINTENANCE OF TRANSFORMERS • ELECTRICAL SAFETY	• FAMILIARIZATION OF TEST & MEASURING INSTRUMENTS & EQUIPMENTS • MEASUREMENT OF RESISTANCE & INSULATION RESISTANCE OF MOTORS • IDENTIFICATION OF MOTOR TERMINALS • MOTOR STARTER CIRCUITS • TROUBLE SHOOTING IN MOTORS &k STARTER CIRCUITS • POLARITY TEST ON TRANSFORMERS • OC & SC TEST ON TRANSFORMER • VOLTAGE REGULATION OF TRANSFORMER • EFFICIENCY OF TRANSFORMER • CONNECTING 3 SINGLE PHASE TRANSFORMERS FOR 3 PHASE CONFIGURATIONS • TESTING OF TRANSFORMER OIL • CT& PT CONNECTIONS

3 ELECTRICAL SAFETY & FIRST AID

THEORY (6 HRS)	PRACTICAL (2 HRS)
• INTRODUCTION TO ELECTRICAL SAFETY • ELECTRICAL HAZARDS • ELECTRIC SHOCK- DEFINITION, CAUSE, SEVERITY OF SHOCK, PROTECTION AGAINST SHOCK, PREVENTIVE MEASURES • EARTHING - TYPES • BURNS – TYPES, CAUSES • ELECTRIC FIRES – CAUSES, PREVENTION, FIRE FIGHTING • SAFETY IN MAINTENACE • INDIAN ELECTRICITY ACT & RULES • FIRST AID • CASE STUDIES	• MEASUREMENT OF INSULATION RESISTANCE & WINDING RESISTANCE • HIGH VOLTAGE TEST ON MOTORS • MEASUREMENT OF EARTH RESISTANCE • DEMONSTRATION & PRACTICE OF SAFE WORKING METHODS • DEMONSTRATION PRACTICE OF USING TOOLS, METERS SAFELY • FIRE FIGHTING • DEMONSTRATION & PRACTICE OF FIRST AID

4 PROTECTIVE RELAYS, CIRCUIT BREAKERS & SWITCH GEARS

THEORY (2 HRS)	PRACTICAL (6 HRS)
PROTECTIVE RELAYS: • FAULTS, CAUSES, EFFECTS PROTECTIVE ZONES, PRIMARY & BACK UP PROTECTION, DESIRABLE QUALITIES Of PROTECTIVE RELAYS	
Construction, working principle, operation, characteristics, settings, calibration & applications of • ELECTROMECHANICAL RELAYS • STATIC RELAYS • NUMERICAL RELAYS • MICROPROCESSOR BASED RELAYS	Operation, setting, tripping, resetting, testing, calibration & finding characteristics of • ELECTROMECHANICAL RELAYS • STATIC RELAYS • NUMERICAL RELAYS • MICROPROCESSOR BASED RELAYS
• PROTECTION OF MOTORS • PROTECTION OF TRANSFORMERS • PROTECTION OF GENERATORS	
CIRCUIT BREAKERS: Construction, working principle, arc extinction / quenching, operation, installation, maintenance & servicing of • AIR CIRCUIT BREAKERS • AIR BLAST CIRCUIT BREAKER • MINIMUM OIL & BULK OIL CIRCUIT BREAKER • VACUUM CIRCUIT BREAKER • SF6 CIRCUIT BREAKER	Operation, trouble shooting, testing, servicing & maintenance of • AIR CIRCUIT BREAKERS • AIR BLAST CIRCUIT BREAKER • MINIMUM OIL & BULK OIL CIRCUIT BREAKER • VACUUM CIRCUIT BREAKER • SF6 CIRCUIT BREAKER
SWITCH GEARS: • Types, requirements • Construction, layout, operation & maintenance	Operation & maintenance of switchgears