

5TH SEM TEACHING SCHEME

Subject code	Subject	Teaching Scheme				Examination Scheme				Total
		T	Tut	Pra	C	THEORY MARKS		PRACTICAL MARKS		
						(ESA)	(PA)	(ESA)	(PA)	
3350901	Wiring Estimating, Costing & Contracting	3	0	2	6	70	30	20	30	150
3350902	Energy Conservation & Audit	4	0	2	6	70	30	20	30	150
3350903	Power Electronics	4	0	2	6	70	30	20	30	150
3350904	Microprocessor & Control System Components	4	0	2	6	70	30	20	30	150
3350907	Electrical Traction And Control	3	0	2	5	70	30	20	30	150
3350908	Project I (Idp/Udp)	0	0	4	4	00	00	40	60	100
	TOTAL	18	0	14	32	350	150	140	210	850

DE EE SEM-5 Detail Syllabus

(3350901) Wiring Estimating, Costing & Contracting

Teaching Scheme			Evaluation Scheme			
Theory	Tutorial	Practical	Mid Term	Internal	University Exam	Credits
3	0	2	30	50	70	6

- 1. Electrical Wiring:** Different types of wires, wiring system and wiring methods, Comparison of different types of wiring. Specifications of Different types of wiring materials, Accessories Different types of wiring tools. Domestic and industrial panel wiring. Different types of wiring circuits. I.E. rules for wiring, Electricity supply act-1948.
- 2. Elements of Estimating and concepts of contracting:** Introduction to estimation & estimation tools. Electrical Schedule of rates, catalogues, Survey and source selection, Recording estimates. Determination of required quantity of material, Labor conditions, Determination of cost material and labour, Contingencies, Overhead charges, Profit, Purchase system, Purchase enquiry and selection of appropriate purchase mode, Comparative statement, Purchase orders, Payment of bills, Terms, conditions, and

types of contract system. Tendering procedure and preparation of simple tender. Procedure for inviting and scrutinizing tender, Importance of Earnest Money Deposit, Security Deposit and S.O.R., Indian Electricity Act and major applicable I.E rules.

- 3. Estimating and Costing of Domestic and Industrial Wiring:** Principles of circuit design in lighting and power circuits, Procedures for designing the circuits and deciding the number of circuits, Method of drawing single line diagram, Selection of type of wiring and rating of wires and cables, Load calculations and selection of size of conductor, Selection of rating of main switch, distribution board, protective switchgear ELCB and MCB and wiring accessories, Earthing of residential Installation, Sequence to be followed for preparing estimate, Preparation of detailed estimates and costing of residential installation, Important considerations regarding motor installation wiring, Determination of input power, input current to motors, rating of cables, rating of fuse, size of Conduit, size of distribution Board, main switch and starter. Preparation of detailed estimates and costing industrial installation, I.E. rules observed for above wiring.
- 4. Estimating and Costing of Service Connection (Domestic and Industrial):** Concept of service connection, Types of service connection and their features, Method of installation of service connection (1-phase and 3-phase), Lay out/ wiring diagram of service connection list of materials and accessories along with specifications required for given installation work. Estimation of service connection for domestic and industrial (1-phase and 3-phase) service connections. I.E. rules pertaining to above wiring.
- 5. Estimation of Transmission line:** Main components of overhead lines, Line supports, Factors governing height of pole, Conductor materials, Determination of size of conductor for overhead Transmission line, Cross arms, Pole brackets and clamps, Guys and Stays, Conductors configuration spacing and clearances, Span lengths, Overhead line insulators, Insulator materials Lightning Arrestors, Points to be considered at the time of erection of overhead lines, Erection of supports, Setting of stays, Earthing of lines, Guarding of overhead lines, Clearances of conductor from ground, Spacing between supports conductors, important specifications and sketches List of materials and accessories required for the given project estimate for material required. I.E. rules pertaining to above project.
- 6. Estimation of Overhead and Underground Distribution System.:** Survey work for estimation of overhead and underground distribution system. Planning and layout of project. List of materials and accessories required for the given project. Procedure for preparing estimate for 440 V, 3-phase, 4 wire or 3 wire overhead and underground distribution system. Necessary drawing/ sketches of overhead and underground system. I.E. rules pertaining to above project.
- 7. Estimating and Costing of Repairs and Maintenance of Electrical Devices and Equipment:** Market survey for cost of given product like D.O.L. starter, small motor, mono block pump, automatic electric iron, table/ceiling fan, ICDP/ICTPSwitch, etc. Preparation of detailed

drawing work of the product.Preparation of material quantity sheet for the product.Find out overall cost of productLocation of fault.Materials required and their cost for remedial measure of fault.Estimation of repairing cost and overall cost.Tools used for repairs & maintenance work Preparation of cost schedule for repair and maintenance of electric fan, automatic electric iron, single phase transformer, mixer grinder, D.O.L. Starter.

Text Books: Electrical Installation Estimating & Costing by J. B. Gupta

Syllabus of (3350902) Energy Conservation & Audit

Teaching Scheme			Evaluation Scheme			
Theory	Tutorial	Practical	Mid Term	Internal	University Exam	Credits
4	0	2	30	50	70	6

1.Elements of Energy Conservation and Management: Concept of energy conservation. Conservation of electrical energy.Energy conservation in different areas.Energy management concept.Elements of energy management.Different approaches of energy management, Energy balance and organization for energy management.Energy conservation Act Introduction of Bureau of Energy Efficiency.

2. Energy Conservation Approaches in Industry: Improvement in power factors in electrical system.Improved illumination design by use of energy efficient light sources.Use of energy efficient electric motors.Reduction in heat loss in motor control centre (starters, main switches, fuse, cables etc)Energy saving in the welding equipment.Use of PAM motors for speed control in traction.Energy Conservation in Traction System by Variable Voltage Variable Frequency for AC Traction System , by Chopper Controlled for DC Traction SystemUse of electronic control in industrial drives.Energy saver technology and equipments

3. Technology Economic Evaluation of Energy Conservation: Calculation and costing of energy conservation project.Depreciation cost, sinking fund method.Cost evaluation by ROI and pay back method etc.Major Learning Outcomes(in cognitive domain),Case study.

4. Energy Conservation in Power Generation Transmission and Distribution: Performance improvement of existing power plant.Use of combined cycle power plants.Use of co-generation plants, Use of small hydro power plants.Improved power transmission lines & reduction in line losses. Power quality-monitoring systems.Energy conservation by demand side management different approaches.

5. Energy Audit: Energy audit-a concept.Detailed energy audit.Preliminary energy audit.Detailed energy audit reporting & remedial measures.Tools of electrical energy audit. Diagnostic approaches.

Text Books: Renewable energy sources and conservation Technology by N. G. Bansal Kleemon & Meliss

Syllabus of (3350903) Power Electronics

Teaching Scheme			Evaluation Scheme			
Theory	Tutorial	Practical	Mid Term	Internal	University Exam	Credits
4	0	2	30	50	70	6

1. **Semi conductor devices and Controlled Rectifier:** Introduction to Thyristor family.Construction, working principle, symbol, characteristics and application of IGBT , GTO, MCT,Advantages and applications of polyphase rectifiers.Three phase half wave rectifier.Three phase full wave or bridge rectifier.Six phase half wave rectifier.Effect of transformer reactance.Single phase half wave and full wave controlled rectifiers using SCR,UJT & phase shift circuits.Construction and use of pulse transformer.Understand principle of A.C. load control.
2. **SCR Protection & commutating Circuits:** Need of protection.Over voltage and over current protection.dv/dt and di/dt ratings of SCR. Use of Snubber circuit. Use of free wheeling diode,Use of thermistor. Use of heat sink.Mounting of SCR.Knowledge of different ratings of the SCR. Need to turn off SCR.Types of commutation.Natural commutation.Forced commutating method.Series Resonance/current commutation.Voltage commutations.Auxiliary SCR for commutation.External pulse commutation.
3. **Choppers:** Principle of chopper.Types of chopper circuit (A type to E-type)Jhone's chopper circuit.Morgans chopper circuit.Applications of chopper.
4. **Inverters & Cyclo Converter:** Working principle of inverter.Types of Inverter Series inverter using SCR. Parallel inverter-using SCR.Use of pulse width modulation circuit.Introduction to cyclo converter.Operating principle.Types of cyclo-converter.Single phase to single phase cyclo converter. Single phase to bridge cyclo converter.

5. **Industrial Applications:** Speed control of D.C. Motor using armature voltage control.Speed control of D.C. Motor using SCR chopper circuit. Speed control of D.C. drive using PLL method.Speed control of universal motor. Different types of speed control methods for induction motor such as stator voltage control, frequency control.Power factor control method.Application in heating control, resistance welding, static circuit breaker and time delay circuits.

Text Books: Power Electronics by M. H. Rashid

Syllabus of (3350904) Microprocessor & Control System

Components

Teaching Scheme			Evaluation Scheme			
Theory	Tutorial	Practical	Mid Term	Internal	University Exam	Credits
4	0	2	30	50	70	6

1. Control Systems: Introduction Role of control system in instrumentation , Open loop and close loop control system,Block diagram of open loop control system,Types of open loop control system,Block diagram of close loop control system, Types of close loop control system,Comparison between open loop and close loop control system, Servomechanism and regulators with suitable examples,On-off type control, Proportional control, Derivative control, Integral control, Proportional derivative (PD) control, Proportional integral (PI) control, PID control, Introduction to basic control components – (a) AC/ DC Servo motor(b) AC/ DC Tacho generator(c) Stepper motor(d) Synchro.

2. Basics of Microprocessor: Introduction to microprocessor,Advantages and disadvantages of microprocessor control over traditional control,Structure of micro processor, Generalized architecture of microprocessor,Functions of each block,Lumped and distributed digital control and their block diagram, Functional block diagram of 8085 microprocessor with pin diagram,logical block diagram of 8085 microprocessor- Registers, ALU, Decoder, Serial control section, Interrupt section, timing and control section,Programming Model of 8085,Addressing Modes, Instruction classification, Instruction format,Basic Assembly Language programming (only simple arithmetic operations-addition, subtraction)

3. Applications of Microprocessor: Different types of memories (ROM, RAM, PROM, EPROM,EEPROM),Schematic diagram of memory chips decoder, memory interfacing., Memory I/O data transfer scheme for 8255. Interfacing of switches and L E D ,Simple applications of

microprocessor (block diagram level, without programming) of, Temperature control of furnace using micro processor, Traffic light control., SCR firing angle control, Data acquisition system.

4. Basics of Microcontroller 8051: Comparison between microcontrollers and microprocessors, Block diagram & pin diagram of 8051 microcontroller, Internal RAM, ROM and Special function Registers in 8051, I/O ports, Interfacing with external memory, Counters and Timers.

5. Programmable Logic Controller & SCADA: Introduction, Advantages & disadvantages, Basic blocks like CPU, I/O modules, bus system, power supplies & remote I/Os, Overview of different PLC's available in market, Selecting a PLC, SCADA- Introduction, Block diagram, Application

Text Book: Microprocessor Architecture, Programming and Applications with the 8085 by Ramesh S. Gaonkar

Syllabus of (3350907) Electric Traction And Control

Teaching Scheme			Evaluation Scheme			
Theory	Tutorial	Practical	Mid Term	Internal	University Exam	Credits
3	0	2	30	50	70	5

1. Traction Systems: Steam, diesel, diesel-electric, Battery and electric traction systems. General arrangement of D.C., A.C. -1-phase, 3-phase, Composite systems. Choice of traction system - Diesel- Electric or Electric.

2. Mechanics Of Train Movement: Analysis of speed time curves for main line, suburban and urban services. Simplified speed time curves, Relationship between principal quantities in speed time curves. Requirement of tractive effort. Specific energy consumption & Factors affecting it. Numerical examples.

3. Traction Motors And Their Control: Features of traction motors. Significance of D.C. series motor as traction motor. A. C. Traction motors- single phase, Three phase, Linear Induction Motor. Comparison between different traction motors. Series-parallel control. Open circuit, Shunt and bridge transition. PWM control of induction motors. different types of electric braking system.

4. Electric Locomotives & Auxiliary Equipment: Important features of electric locomotives. Different types of locomotives, Current collecting equipment. Coach wiring and lighting devices. Power conversion and transmission systems. Control and auxiliary equipment.

5. Feeding And Distribution System: Distribution systems pertaining to traction (distributions and feeders). Traction sub-station requirements and selection. Method of feeding the traction sub-station.

6. Future Trends In Traction: Energy conservation in Electric traction. Indian present scenario in electric traction.-MetroMagnetic levitation- Levitation Schemes.- Present Scenario High speed traction.

Text Book: Modern Electric Traction by H. Partab