

**4TH SEM
TEACHING SCHEME**

| Subject code | Subject | Teaching Scheme | | | | Examination Scheme | | | |
|--------------|--|-----------------|-----|-----|----|--------------------|------------|------------|------------|
| | | T | Tut | Pra | C | (E) | (M) | (I) | Total |
| 3340901 | Polyphase Transformers and Rotating AC Machines | 4 | 0 | 4 | 8 | 70 | 30 | 50 | 150 |
| 3340902 | Transmission and Distribution of Electrical Power | 4 | 0 | 2 | 6 | 70 | 30 | 50 | 150 |
| 3340903 | Utilization of Electrical Energy | 4 | 0 | 2 | 6 | 70 | 30 | 50 | 150 |
| 3340904 | Digital Electronics and Digital Instruments | 4 | 0 | 2 | 6 | 70 | 30 | 50 | 150 |
| 3340905 | Computer Aided Electrical Drawing and Simulation | 0 | 0 | 4 | 4 | 60 | 40 | 00 | 100 |
| | TOTAL | | | | 30 | 340 | 160 | 200 | 700 |

DE EE SEM-4 Syllabus:- (3340901)Polyphase Transformers and Rotating AC Machines

| Teaching Scheme | | | Evaluation Scheme | | | |
|-----------------|----------|-----------|-------------------|----------|-----------------|---------|
| Theory | Tutorial | Practical | Mid Term | Internal | University Exam | Credits |
| 4 | 0 | 4 | 30 | 50 | 70 | 8 |

Unit – I. Poly Phase Transformer- Comparison of three phase transformer with bank of three single phase transformers, Arrangement of Core and windings in transformer, use of tap changer. Types of losses in transformers. Construction - Accessories of 3 phase transformer: Main tank, bushings, conservator with breather, oil level gauge, radiators, buchholz relay, explosion vent, temperature indicators, junction box Star delta connections and vector groups, Cooling of transformer: Natural cooling, Forced cooling , Parallel operation – Essential and desirable Conditions ,Maintenance of different types of transformers.

Unit– II, Poly Phase Induction Motors-Construction, types - Squirrel cage -Single and double cage, Wound rotor, Working principle with Torque-slip curve, equivalent circuit and phasor diagram, Torque equation, Starting, running and condition for the maximum torque, Necessary and types of starters- DOL, Star delta, autotransformer type and rotor resistance starter, No load test and Blocked rotor test, Losses and efficiency, Speed control of squirrel cage and slip-ring induction motor, Maintenance of different types of induction motors.

Unit- III Alternator -Principle of working and construction.-Salient and Cylindrical rotor, Equivalent circuit and phasor diagram, Voltage regulation by synchronous impedance method, OC, SC characteristics, Synchronization of alternator with bus bar/alternator, Cooling system of alternator, Maintenance of different types of alternators.

Unit-IV Synchronous Motor-Principle of working, starting methods, Equivalent circuit and phasor diagram, Effect of change in excitation 'V'- curves Synchronous condenser, Hunting and its prevention, Different torque of a synchronous motor, Maintenance of synchronous motors.

Unit-V Single Phase Induction Motors-

Working of different types of single-phase induction motors, Fractional horse power motors, Speed torque characteristics, Maintenance of different types of single phase motors.

Reference Book: Electrical Technology Vol. II , B. L. Theraja

Syllabus Of Transmission and Distribution of Electrical Power (3340902)

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| 4 | 0 | 2 | 30 | 100 | 70 | 6 |

UNIT – I Transmission Line Components Reference Books:- Classification of transmission lines, Comparison of different types of transmission systems, Types of conductors-Copper, Aluminum: Solid, stranded and bundled conductor, Line insulators requirements, types, Failure of insulator, String efficiency, methods of improving string efficiency, Spacing between conductors, span length and sag calculation.

UNIT- II Performance Of Transmission Lines:-

Skin effect, proximity effect and Ferranti effect. Corona, Transposition of conductors, Losses, efficiency and regulation of line, Performance of single phase short transmission, Effect of load power factor on performance, Features of short, medium and long transmission lines, Load dispatch Centre.

UNIT-III EHV Transmission:-

Requirement of EHV transmission, HVAC Transmission, HVDC Transmission, Impact of Wind power and solar power on Transmission Systems, Impact of other renewable energy sources on Transmission Systems, FACTS devices.

UNIT-IV Distribution System Components:- AC distribution and its Requirements, Connection schemes of distribution system, A.C. distribution calculations, Issues of Distributed Generation Integrated to distribution Grid, Methods of solving A.C.-1 phase and 3 Ø –phase connected (balanced) distribution system.

UNIT-V Sub-Station And Cables:- Types of substations: 11, 33, 66 and 110 Kv, Selection and location of site, Main connection schemes, Substation Equipment, Busbar arrangement.

Reference Books: Principles of power system, Mehta V. K.

Syllabus of (3340903) Utilization of Electrical Energy

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Unit – I Illumination:-

Illumination terminology: Solid and plane angle, Luminous Flux, Luminous Intensity, Lumen, Candle Power, Lux, Lamp Efficiency, Specific Consumption, Glare, Space-Height Ratio, Utilization Factor, Maintenance Factor, Absorption Factor, Reflection Factor

Law of Inverse Squares and Lambert's Cosine Law, Incandescent Lamp, Low Pressure Mercury Vapour Lamps (Fluorescent Tube), High Pressure Mercury Vapour (HPMV) Lamps, High Pressure Sodium Vapour(HPSV) Lamps, Compact Fluorescent Lamps (C.F.L.), Halogen Lamps, Metal Halide lamp, Electronic ballasts.

Unit– II Electrical Heating and Welding:-

Requirements of heating element materials Resistance and Arc heating, Resistance Heating : Direct(Salt Bath Furnace), Indirect Resistance Heating(Resistance Ovens), Arc Heating and its applications, Types of Arc furnace -Direct and Indirect,Methods of Temperature Contro, Induction Heating and its applications, , Types of induction furnace, Core Type (Ajax Wyatt) and Coreless type Induction Furnace, Dielectric Heating and its applications, Quality of a good weld, welding defects, Principle of Resistance Welding, Types of Resistance welding – Spot, Seam, Butt, Projection, Percussion and flash butt welding, Principle of Electric Arc welding, Types of Arc welding Machines, . DC Welding Machines–MG Set,AC Rectified welding unit,. AC welding Machines–welding Transformer,

Unit–III Electric Drives And Elevators:- Source, Power modulator, Electric motor, Control unit and Load, Electrical characteristics, Mechanical factors, Nature of load torque, Size and cost . Comparison of DC & AC Drive and, Individual & Group Drive, Speed Torque Characteristics of the Motor, Types of electric elevator machines and their motors, Power transmission gears and braking, Safety in elevators, Lift and elevator Act; such as Gujarat Lift Act Nov 2001and others.

Unit-IV Electric Traction:- Requirements of ideal Traction System. Traction Mechanics: Types of Services, Speed Time Curve, Supply system: DC System, Composite System, Single Phase ac system with low and normal, frequency and 3 phase system.

Unit-V Domestic Electrical Appliances:- Domestic electrical appliances: Electric iron, . Electric toaster, Electric water heater,. Microwave oven, Fans (Ceiling and Table fan), Washing Machine,. Grinder/ Mixer/ juicer, Vacuum Cleaner, Flour Mill etc, Air conditioner. Concept of Star System for energy conservation.

Reference Books: Utilization of Electric Power & Electric Traction, J. B. Gupta

Syllabus of (3340904) Digital Electronics and Digital Instruments

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Unit – I Number Systems:- Types of number system, inter conversion, Basic mathematical operations – 1’s complement, 2’s complement, 9s complement and 10’s complement, Binary addition, subtraction, multiplication and division, Introductions to codes – Binary, weighted, non weighted codes, Excess code, Grey code, BCD code, Hamming code (only introduction).

Unit– II Logic Gates And Wave Shaping Circuits :- Diode and transistor as a switch, Diode as a clipper circuit, Positive logic and negative logic levels, Different types of logic gates, symbol and truth table, Universal gates - NAND and NOR, Logic family RTL, DTL, NMOS, PMOS and CMOS.

Unit– III Boolean Algebra and Combinational Circuits:- Laws of Boolean algebra, Demorgan’s theorems, Boolean expression and logic diagram and vice versa, Simplification of given Boolean equation, Combinational circuits: Half and Full Adder, half and full Subtractor, Multiplexer and Demultiplexer Encoder and Decoder.

Unit- IV Sequential Circuits:- Flip-Flop (FF) circuits: R-S, D, J-K and master slave J-K, Shift register: series, parallel left and right, Asynchronous and Synchronous counter using 7493 and 7490, Introduction of Semiconductor memory RAM, ROM, PROM, EPROM and EEPROM

Unit-V A to D And D to A Convertors and Display Devices :- Digital to Analog conversion, Weighted Resistor Network type, Binary Ladder Network type, Analog to Digital conversion, Parallel Comparator type, Successive approximation type, Counter OR Staircase type, Display devices, Mechanical Drum or Disc type, Light Emitting Diode type, Liquid Crystal Display.

Unit-VI Digital Instruments:-

Comparison of digital instrument with analog instrument, Basic building blocks of -digital instruments, Digital volt-meter - Ramp and Staircase type, Digital frequency meter, multi meter, Digital watt meter, Digital energy meter.

Reference Books: Digital Electronics, Sanjay Sharma

Syllabus of (3340905) Computer Aided Electrical Drawing and Simulation

| Teaching Scheme | | | Evaluation Scheme | | | |
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| Theory | Tutorial | Practical | Mid Term | Internal | University Exam | Credits |
| 0 | 0 | 4 | 00 | 100 | 00 | 4 |

Unit – I Computer Aided Electrical Drawing:-

Procedure to be adopted for computer aided drawings, Electrical machines - AC and DC, motor starters, measuring and display instruments etc, R-L series, parallel circuit, R-C series, parallel circuit, R-L-C series, parallel circuit, D.C. machine parts and cross sectional view, A.C. machine parts and cross sectional view, A.C. and D.C. winding diagrams, Lighting and power wiring diagram.

Unit– II Computer Aided Electronics Drawing:- Symbols and notations of: Electronic components - Resistor, Inductor, transformer and Capacitor Semiconductor device Diodes, Zener diode, Transistors PNP/ NPN, Tunnel diode, photo diode, varactor, FET, MOSFET, IGBT, UJT etc, Half-wave, full-wave and bridge rectifier, Power amplifier and voltage amplifier and different types of oscillators circuits.

Unit– III Simulation of Electrical Circuits :-

Getting started, ending, commonly used blocks, Creating a model, Assigning Variables, Observing Variables during Simulation, Storing/Saving Data, Creating and Masking Sub-systems Series and parallel R-L circuit, Series and parallel R-C circuit, Series and parallel R-L-C circuit, Resonance in AC Circuit and Electrical machines circuits, Graphics, Plot, sub plot, label, legend etc.

Unit–IV Simulation of Electronics Circuits:- Half wave, full wave and bridge rectifier, Power amplifier and voltage amplifier Different types of oscillators circuits.

Unit-V Computer Aided PCB Design :- Overview of software for PCB design, PCB layout of rectifier circuit, PCB layout of amplifier circuit, PCB layout of oscillator circuit.

Reference Books: AutoCAD 2013 for Engineers and Designers, Sham Tickoo