BEA-401 Energy, Ecology, Environment and Society

UNIT-1

Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydro, nuclear sources.

UNIT-2

Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation

UNIT-3

Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Green house effect, ozone layer depletion, acid Rain. Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non – industrial.

UNIT-4

Water Pollution– Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent. Soil Pollution – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

UNIT-5

Society, Ethics & Human values– Impact of waste on society. Solid waste management Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study . Preliminary studies regarding Environmental Protection Acts , introduction to value education, self exploration, sanyam & swasthya.

References:-

1. Harris, CE, Prichard MS, Rabin's MJ, "Engineering Ethics"; Cengage Pub.
2. Rana SVS ; "Essentials of Ecology and Environment"; PHI Pub.
3. Raynold, GW "Ethics in information Technology"; Cengage.
4. Svakumar; Energy Environment & Ethics in society; TMH
5. AK De "Environmental Chemistry"; New Age Int. Publ.
6. BK Sharma, "Environmental Chemistry" ; Goel Publ. House.
7. Bala Krishnamoorthy; "Environmental management"; PHI
8. Gerard Kiely, "Environmental Engineering" ; TMH
9. Miller GT JR; living in the Environment Thomson/cengage
10. Cunninghan WP and MA; principles of Environment Sc; TMH
11. Gandhiji M.K.- My experiments with truth

EEA- 402 Digital Electronics

UNIT-I

Fundamentals of Digital Systems And Logic Families Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT-II

Combinational Digital Circuits Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De- Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator ,parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT-III

Sequential Circuits And Systems A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, Applications of flip flops, shift registers, applications of shift registers, series to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple(Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.

UNIT-IV

A/D and D/A Converters Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter lCs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D Converter ICs

UNIT-V

Semiconductor memories and Programmable logic devices. Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex
Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

References:

1. R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009.
2. M. M. Mano, "Digital logic and Computer design", Pearson Education India, 2016.
3. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.

List of Experiments :-

1. To test and study of operation of all logic Gates for various IC's.
2. Implementation of AND, OR, NOT, NOR, X-OR and X-NOR Gates by NAND and NOR Universal gates.
3. Binary Addition by Half Adder and Full Adder circuit.
4. Binary Subtraction by Half Subtractor and Full Subtractor circuit.
5. Design a BCD to Excess-3 code converter.
6. Verification of the Demorgan's Theorem.
7. Multiplexer/Demultiplexer based Boolean function realization.

EEA- 403 Electrical Machines – II

UNIT-I

Fundamentals of AC Machine Windings coil - active portion and overhang; full-pitch coils, concentrated winding, distributed winding, winding axis, 3d visualization of the above winding types, air-gap mmf distribution with fixed current through winding-concentrated and distributed, sinusoidally distributed winding, winding distribution factor

UNIT-II

Pulsating and Revolving Magnetic Fields Constant magnetic field, pulsating magnetic field - alternating current in windings with spatial displacement, magnetic field produced by a single winding - fixed current and alternating current pulsating fields produced by spatially displaced windings, windings spatially shifted by 90 degrees, addition of pulsating magnetic fields, three windings spatially shifted by 120 degrees (carrying three-phase balanced currents), revolving magnetic field.

UNIT-III

Induction Machines (12 Hours): Construction, types (squirrel cage and slip-ring), torque slip characteristics, starting and maximum torque, equivalent circuit. phasor diagram, losses and efficiency, effect of parameter variation on torque speed characteristics (variation of rotor and stator resistances, stator voltage, frequency), methods of starting, braking and speed control for induction motors, generator operation, self-excitation, doubly-fed induction machines.

UNIT-IV

Single-Phase Induction Motors (6 Hours): Constructional features double revolving field theory, equivalent circuit, and determination of parameters, split-phase starting methods and applications

UNIT-V

Synchronous Machines (10 Hours): Constructional features, cylindrical rotor synchronous machine - generated emf, equivalent circuit and phasor diagram, armature reaction, synchronous impedance, voltage regulation, operating characteristics of synchronous machines, v-curves, salient pole machine - two reaction theory, analysis of phasor diagram, power angle characteristics, parallel operation of alternators - synchronization and load division.

References:

1. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", McGraw Hill Education, 2013.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
4. I. J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.
5. A. S. Langsdorf, "Alternating current machines", McGraw Hill Education, 1984.
6. P. C. Sen, "Principles of Electric Machines and Power Electronics", John Wiley & Sons, 2007.

List of Experiments :-

1. To perform No-load and block rotor test on a 3- phase IM and determine its equivalent circuit.
2. To Perform load test on a 3- phase IM and plot its performance characteristics.
3. Study of various types of starters used for 3- IMs.
4. To determine regulation of alternator using mmf and zpf methods.
5. To synchronise alternator with infinite bus bar.
6. To plot V and inverted V curves for a synchronous motor.
7. To find Xd and Xq of salient pole synchronous machine by slip test.

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EEA- 404 Power System – I

UNIT-I

Introduction: Typical layout of an electrical power system–present power scenario in india. generation of electric power: conventional sources (qualitative):hydro station, steam power plant, nuclear power plant and gas turbine plant, non-conventional sources (qualitative): ocean energy, tidal energy, wave energy, wind energy, fuel cells, and solar energy, cogeneration and energy conservation and storage.

UNIT-II

Economics of Generation: Introduction, connected load, maximum demand, demand factor, load factor, diversity factor, load duration curve, number and size of generator units, base load and peak load plants, cost of electrical energy-fixed cost, running cost, tariff on charge to customer.

UNIT-III

Transmission Systems: Various Systems of transmission & their comparison, HVDC transmission converter, inverter, filters & substation layout, voltage and reactive power control.
Cables: Classification, Construction and characteristic of different types, insulation resistance and capacitance, grading (capacitance and inter sheath), laying, jointing and splicing of cables. phenomenon of dielectric losses, dielectric stress and sheath loss in cables.

UNIT-IV

Distribution Systems: Primary and secondary distribution systems, concentrated & uniformly distributed loads on distributors fed at one and both ends, ring distribution, sub mains and tapered mains, voltage drop and power loss calculations, voltage regulators, feeders kelvin's law and modified kelvin's law for feeder conductor size .

UNIT-V

Overhead Transmission Lines: Types of Conductors, line parameters: calculation of inductance and capacitance of single and double circuit transmission lines, three phase lines with stranded and bundle conductors, Generalized ABCD constants and equivalent circuits of short ,medium & long lines, line performance: circle diagram, regulation and efficiency of short, medium and long lines.

References:-

1. Ashfaque hussain , CBS Publication,2014
2. C.L. Wadhwa –Generation, Distribution and Utilization of Electrical Energy, Second Edition, New Age International, 2009
3. C.L. Wadhwa –Electrical Power Systems, Fifth Edition, New Age International, 2009
4. M.V. Deshpande –Elements of Electrical Power Station Design, Third Edition, WheelerPub. 1998
5. V.K. Mehta principal of electrical power system, S Chand Publication
6. J.B. Gupta electrical power system,kataria and sons publication

List of Experiment:-

1. To study and draw the typical Layout of an Electrical Power System
2. To draw the Electrical design of transmission line.
3. 3 To draw the Mechanical design of transmission line.
4. To study AC distribution- Single phase, 3-phase& 3 phase 4 wire system.
5. 5. Study of different type of insulator.
6. To study and draw the typical Layout of substation
7. To study and draw different types of towers
8. Study of different type of cables.

EEA- 405 Power Electronics

UNIT-I

Power Switching Devices Diode, thyristor, MOSFET, IGBT: their characteristics; firing circuit for thyristor; voltage and current commutation of a thyristor; gate drive circuits for MOSFET and IGBT.

UNIT-II

Thyristor Rectifiers Single-phase half-wave and full-wave rectifiers, Single-phase full-bridge thyristor rectifier with R load and highly inductive load; Three-phase full-bridge thyristor rectifier with R-load and highly inductive load; Input current wave shape and power factor.

UNIT-III

DC-DC Buck Converter Elementary chopper with an active switch and diode, concepts of duty ratio and average voltage, power circuit of a buck converter, analysis and waveforms at steady state, duty ratio control of output voltage.

UNIT-IV

DC-DC Boost Converter Power circuit of a boost converter, analysis and waveforms at steady state, relation between duty ratio and average output voltage.

UNIT-V

Single-Phase Voltage Source Inverter

Power circuit of single-phase voltage source inverter, switch states and instantaneous output voltage, square wave operation of the inverter, concept of average voltage over a switching cycle, bipolar sinusoidal modulation and unipolar sinusoidal modulation, modulation index and output voltage

Three-Phase Voltage Source Inverter

Power circuit of a three-phase voltage source inverter, switch states, instantaneous output voltages, average output voltages over a sub-cycle, three-phase sinusoidal modulation

References:

1. M. H. Rashid, “Power electronics: circuits, devices, and applications”, Pearson Education India, 2009.
2. N. Mohan and T. M. Undeland, “Power Electronics: Converters, Applications and Design”, John Wiley & Sons, 2007.
3. R. W. Erickson and D. Maksimovic, “Fundamentals of Power Electronics”, Springer Science & Business Media, 2007.
4. L. Umanand, “Power Electronics: Essentials and Applications”, Wiley India, 2009

List of Experiments:-

1. To study V-I characteristics of SCR.
2. To study UJT trigger circuit for half wave and full wave control.
3. To study single-phase half wave controlled rectified with R load (ii) L load with and without freewheeling diode.
4. To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads.
5. To study single-phase ac voltage regulator with resistive and inductive loads.
6. To study single phase cyclo-converter.
7. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor.
8. To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.

EEA- 406 Software Lab-I (Circuit Simulator)

List of Experiments:-

1. Study of circuit simulation software (any one- TINA-PRO/ PSPICE/ CIRCUIT MAKER/ GPSIM/SAPWIN etc).

2. Designing and Simulation of Different Electronics Circuit .

3. Designing and Simulation of Different Network Circuit.

4. Designing and Simulation of Digital Logic Circuit.

5. Designing and fabrication of PCB with circuit simulator

EEA- 407- Industrial Training – I

The Industrial Training– I should be the outcome of the training done/performed during semester break of 4th Semester .It should be submitted in hardware form (proto type)or simulation form along with proper data and certificates issued during project training. It should cover the electrical engineering aspects learned during training. A Power point presentation should also be submitted at the time of submission.

To be completed during fourth semester Semester break. Its evaluation/credit to be added in fifth semester