DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CIRCULAR NO.SU/Engg./B.E.IIIrd Yr./64/2018

It is hereby informed to all concerned that, the syllabi prepared by the Board of Studies & recommended by the Dean, Faulty of Science & Technology the **Academic Council at its meeting held on 30 June & 02 July 2018 has accepted the following syllabi in accordance with Choice Based Credits & Grading System for all Branches Third Year Engineering & Second Year of Bachelor of Architecture** under the Faulty of Science & Technology as enclosed herewith:-

Sr.No.	Syllabi as per CBC & GS
[1]	Third Year B.E.[Civil Engineering],
[2]	Third Year B.E [Mechanical Engineering],
[3]	Third Year B.E [EE/EEE/Electrical, Electronics & Power,],
[4]	Third Year B.E [Chemical Engineering],
[5]	Third Year B.E [Instrumentation Engineering],
[6]	Third Year B.E [E&TC/E&C/IE/ECT],
[7]	Third Year B.E [CSE/IT].
[8]	Second Year of Bachelor of Architecture.

This is effective from the Academic Year 2018-2019 and onwards.

All concerned are requested to note the contents of this circular and bring the notice to the students, teachers and staff for their information and necessary action.

University Campus, ★
Aurangabad-431 004. ★
REF.NO.SU/2018/ ★
Date:- 03-07-2018./ 10497 -03 ★

6/7/18
Deputy Registrar,
Syllabus Section

*****

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1] The Principals, affiliated concerned Colleges, Dr. Babasaheb Ambedkar Marathwada University.

2] The Director, University Network & Information Centre, UNIC, with **a request to upload this Circular on University Website.**

Copy to :-

1] The Director, Board of Examinations & Evaluation,
2] The Section Officer, [Engineering Unit] Examination Branch,
3] The Section officer, [Eligibility Unit],
4] The Programmer [Computer Unit-1] Examinations,
5] The Programmer [Computer Unit-2] Examinations,
6] The In-charge, [E-Suvidha Kendra],
7] The Public Relation Officer,
8] The Record Keeper,

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD.

Curriculum under Choice Based Credit & Grading System

Revised Syllabus of
Bachelor of Engineering
Third Year
EE/EEE/
/Electrical,Electronics & Power

Under the Faculty of Science & Technology

[Effective from the Academic Year 2018-19 &onwards/-

Dr. Babasaheb Ambedkar Marathwada University Aurangabad.

Tentative Teaching and Examination scheme of TE (EEP / EE / EEE) wef. 2018-19

	Semester -I	**Contact hr/week**				**Examination Scheme**					
CODE	**Subject**	**L**	**T**	**P**	**Total**	**CT**	**TH**	**TW**	**P**	**Total**	**Duration of Theory Exam**
EEP/301	Power System Analysis	4	-		4	20	80			100	3 Hr
EEP/302	Microprocessor and Interfacing	4	-		4	20	80			100	3 Hr
EEP/303	Electromagnetic Fields	4	-		4	20	80			100	3 Hr
EEP/304	Control System Engineering	4	-		4	20	80			100	3 Hr
EEP/305	**Elective II**	4	-		4	20	80			100	3 Hr
EEP/321	LAB 1 Power System Analysis	-	-	2	2				50	50	
EEP/322	LAB II Microprocessor and Interfacing	-	-	2	2				50	50	
EEP/323	LAB III Control System Engineering	-	-	2	2			50		50	
EEP/324	LAB IV **Elective II**	-	-	2	2			50		50	
BSH305	Communication Skill –II (*Online Exam)	-	-	2	2				50*	50	
	TOTAL	20	-	10	30	100	400	100	150	750	

Elective II

1. Special Purpose Electrical Machines
2. Digital Electronics
3. Communication System

Dr Babasaheb Ambedkar Marathwada University Aurangabad.

Tentative Teaching and Examination scheme of TE (EEP /EE /EEE) wef 2018-19

	Semester -II	**Contact hr/week**				**Examination Scheme**					
CODE	**Subject**	**L**	**T**	**P**	**Total**	**CT**	**TH**	**TW**	**P**	**Total**	**Duration of Theory Exam**
EEP/351	Electrical Machine Design	4	-		4	20	80			100	3 Hr
EEP/352	Testing and Maintenance of electrical equipments	4	-		4	20	80			100	3 Hr
EEP/353	Power Electronics – I	4	-		4	20	80			100	3 Hr
EEP/354	Microcontroller and Applications	4	-		4	20	80			100	3 Hr
EEP/355	**Elective III**	4	-		4	20	80			100	3 Hr
EEP/371	LAB 1 Electrical Machine Design	-	-	2	2			25		25	
EEP/372	LAB II Testing and Maintenance of electrical equipments	-	-	2	2			50		50	
EEP/373	LAB III Power Electronics – I	-	-	2	2				50	50	
EEP/374	LAB IV Microcontroller and Applications	-	-	2	2				50	50	
EEP/375	LAB V **Elective III**	-	-	2	2				50	50	
EEP/376	**Seminar**							25		25	
	TOTAL	20	-	10	30	100	400	100	150	750	

Elective III

1. Digital System Design
2. Industrial Management
3. Energy conservation and Audit

EEP/301– POWER SYSTEM ANALYSIS

Teaching Scheme
THEORY: 4 Hrs/Week
Practical: 2 Hrs/Week
Marks

Examination Scheme
Theory paper: 80 Marks
Internal Assessment: 20

Unit-I: Modeling of Power System: [8 hrs]

complex power flow, balanced and reactance diagrams of a power system, per unit system per unit representation of transformers, synchronous machines, representation of loads. Graph theory and its applications for formation of primitive network and Z and Y matrices, Incidence matrices, Y-bus and Z-bus matrices.

Unit-II: Load Flow Studies: [10 hrs]

Introduction, network model formulation, formation of Y-bus by singular transformation, load flow problem, iterative methods of load flow such as Gauss Gauss-Seidel, Newton-Raphson method, decoupled load flow and fast decoupled load flow

Unit-III: Symmetrical Fault Analysis: [6 hrs]

Transients on a transmission line, short circuit of a synchronous machine on no load and on load. Short circuit current computation on no load and on load, selection of circuit breakers, Z-bus formulation, algorithm of short circuit studies.

Unit IV: Symmetrical Components: [6 hrs]

Fundamentals of symmetrical components, sequence impedance and sequence network of star connected loads, transmission lines, synchronous machines, and transformer, sequence network of a loaded generator.

Unit V: Unsymmetrical Fault Analysis: [6 hrs]

signal line to ground (l-g), Line to line (L-L), double line-to ground (L-L-G) faults analysis of above faults using bus impedance matrix, bus voltage and line current during faults. open conductor faults

Unit VI: Security Analysis: [4 hrs]

Basic Concepts, Static Security Analysis at Control Centers, Contingency Analysis, Contingency Selection.

Term Work :

The term work shall consist of either writing computer programs or solving following power system problems using MATLAB or other software and a ***mini project*** related to the subject.

1. Solution of Building the bus admittance matrix for given power system network.
2. Solution of power flow problem for given power system network using Gauss-Seidel method.
3. Solution of power flow problem for given power system network using Newton- Raphson method.
4. Solution of power flow for given power system network using Fast-decoupled method
5. Solution of Formation of bus impedance matrix by building algorithm method.
6. Solution of computing the fault current, bus voltage, and line currents.

Text books:

1. I.J. Nigrath & D.P. Kothari, "Modern System Analysis", Tata McGraw- Hill
2. Stevenson W.D "Elements of Power System Analysis", McGraw- Hill
3. Wadhawa C.L "Elements Power System", John Wiley & sons,

Reference Books:

- "Power System Analysis", T.K. Nagsarkar, M.S. Sukhiya. (OXFERD U. P.)
- Stevenson W.D. and Grainger J.J. "Power System Analysis" McGraw- Hill
- A.R. Bergen and Vijay Vittal, *Power Systems Analysis*, Pearson Education Asia, 2001.
- Stagg W.D. & El-Abiad A. H. "Computer Method in Power System Analysis", McGraw- Hill
- H.Saadat "Power System analysis", McGraw- Hill
- Elgred O.I. electrical Energy System Theory", McGraw-Hill.
- J.D. Glover, M. Sarma and T.J. Overbye, *Power System Analysis and Design*, Fourth Edition, Thomson Engineering Press, 2008.

EEP/302– MICROPROCESSOR & INTERFACING

Teaching Scheme
Theory: 4 Hrs/Week
Practical: 2 Hrs/Week

Examination Scheme
Theory Paper: 80 Marks
Internal Assessment: 20 Marks
Practical : 50 Marks

UNIT I: Introduction to Microprocessor **[4hours]**

Introduction to Microprocessor, Microprocessor System with bus organization, Microprocessor Architecture and operation, Memory and Input/Output devices, Memory and Input/Output operation.

UNIT II: 8085 Microprocessor Architecture **[8 hours]**

8085 Microprocessor Architecture, Address, Data and Control Buses, Pin Functions, Demultiplexing of buses, Generation of Control Signals, Instruction cycle, Machine Cycle, T-State, Memory Interfacing.

UNIT III: Assembly Language Programming Basics **[12 hours]**

Assembly Language Programming Basics, Classification of instructions, Addressing modes, 8085 instruction set, Instruction and data formats, Writing, Assembling and Executing a program, Debugging the program, decision making, looping, stack& subroutines, developing counters & time delay routines, Code converters, BCD Arithmetics, 16 bit data operations.

UNIT IV: Interfacing Concepts **[12hours]**

Interfacing Concepts, ports, Interfacing of I/O devices such as LED, LCD Seven Segment LED, Keyboards, stepper motor, relay , Interrupts in 8085,Interfacing of Converters(A to D and D to A), Programmable interfacing devices like 8279 keyboard/Display Controller, 8255 PPI, 8253/8254 Timer, 8259 PIT,8257 DMA Controller, Serial I/O Concept, SID and SOD, 8251 USART, Interfacing of these chips with 8085 and its programming in different modes.

UNIT V: Microprocessor Applications **[4hours]**

Power systems : Measurements of Voltage, frequency, power factor, MP based protective relays, Electrical drives- Stepper motor control, DC motor speed control.

Books:

1. Microprocessor Architecture, Programming and Applications with 8085- Ramesh Gaonkar, Penram International
2. Microcomputer and Microprocessors : The 8080,8085 ans Z-80 Programming, Interfacing and troubleshooting – John E. Uffenbeck
3. Microprocessor and Microcontroller Fundamentals- The 8085 and 8051 Hardware and software- William Kleitz
4. Microprocessor and programmed logic – K.C. Short,2nd Edition, Pearson Education.
5. Fundamentals of Microprocessor and Microcomputers- B.Ram. TMH
6. Microprocessors and Peripherals B.Venkatramani,TMH

Practical Exam:

The practical exam will be of three hours duration. It will consist of one experiment conducted during the course and oral exam based on the syllabus.

List of Practicals

1. 6/8 Assembly Language Programs which should include 8 bit and 16 bit operations, BCD operation and Block data transfer technique
2. Interfacing of I/O Devices : LED, Keyboard, LCD, Sevensegment LED (at least two)
3. Interfacing of stepper Motor
4. Interfacing of Converters ADC 0808/0809 and DAC 0808
5. Interfacing using 8279,8259,8253,8257(at least two)

EEP/303- ELECTROMAGNETIC FIELDS

TEACHING SCHEME: EXAMINATION SCHEME:

THEARY: 4 HRS./WEEK. THEORY PAPER: 80 MARKS

Unit: 1 Vector analysis: [7hours]

Scalars and vectors, Vector algebra, Vector components and unit vectors, Vector field, The Cartesian Co-ordinate System, Dot, cross products, circular, cylindrical and spherical coordinate systems.Coulomb's Law and electric field intensity, Electric field due to a continuous Volume Charge Distribution, field of a line charge, field of a Sheet of a charge, streamlines and sketches of fields.

Unit:2 Electric Flux Density Gauss Law and divergence: [7 hours]

Gauss's Law and its Applications: to some symmetrical charge distribution and differential volume element, divergence, Maxwell's first equation (electrostatics), the vector operator and the Divergence theorem, Energy and Potential Energy expended in moving a point charge in an electric field, line integral, potential difference and potential, potential gradient, potential field of a point charge and system of charges, dipole, energy density in electrostatic field.

Unit:3 Conductors, dielectric and capacitance: [7 hours]

Current and current density, continuity of current, metallic conductors, conductor properties and boundary conditions and method of images, semiconductors, nature of dielectric, boundary conditions for perfect dielectric, capacitance, and capacitance of two-wire line. Poisson's and Laplace Equations: Uniqueness theorem, examples in rectangular, spherical and cylindrical coordinates, product solutions of Laplace equations, and solutions of Poisson's equations

Unit:4 Steady Magnetic Field [7 hours]

Biot-Savart's law, Amperes circuital law, curls, strokes theorem, magnetic flux and magnetic flux density, scalar and vector magnetic potentials.

Unit:5 Magnetic forces and inductance: [7 hours]

Force on moving charge, differential current element, force between differential current element and torque on a closed circuit, nature of magnetic materials, magnetization permeability, magnetic boundary conditions, magnetic circuit, potential energy and forces on magnetic materials, self and mutual inductance.

Unit:6 Time varying fields and Maxwell's equations: [5 hours]

Faradays law, Maxwell's equations in point form, Maxwell's equations in integral form, retarded potentials.

TEXT BOOKS:

- William H.Hayt. "Engineering Eletromagnetics" Tata McGraw-hill Fifth edition.
- EdministerSchawn's "Outline Theory and Problems of Electromagnetics" Tata McGraw-hill edition.

REFERENCE BOOKS:

- "Elements of electromagnetics" Matthew n. o.Sadiku.
- Singh, "Electromagnetic Waves and Fields" Tata McGraw-hill edition.
- P.C.Krause, "Electromagnetic Fields", McGraw Hill Publication..
- "Introduction to Electromagnetic Field" By Paul
- "Principles of Electromagnetics" By Mahaptra
- "Electromagnetic Waves" by Shegaonkar

EEP/304- CONTROL SYSTEMS ENGINEERING

Teaching Scheme:
Theory: 4hrs /Week
Practical: 2Hrs /Week

Examination Scheme:
Theory Paper: 80marks,
Internal Assessment Marks: 20Marks
Practical & Oral: 50 Marks

Unit 1: Basic concept, Modeling and representation of control system and Components [8 hours]

Basic concept of control system, notion of feedback, Open and closed-loop systems, Transfer function modeling and representation of Control system., Linear Mathematical physical systems "Mechanical System"(Translational and Rotational),Electrical analogy, Block reduction technique ,Signal flow graph, Mason's Gain formula ,Servo components: Error detectors, Potentiometer, synchros and gyros, optical rotary encoders, DC and AC Servomotors, stepper motor, gear trains, Transfer function and applications of these in control systems.

Unit 2: Time Domain Analysis [6 hours]

Type and order of Control System, Typical test signal "Step, Ramp, Parabolic and Impulse signals. Time response of First and second order systems to unit step input, Time domain specifications of second order systems, Steady state errors and definitions of error constants K_P,K_V and K_A Concept of system sensitivity to disturbance signals.

Unit3: Stability [6 hours]

Concept of Stability : Absolute, relative and marginal, nature of system response for the various location of roots in the S-plane of characteristic equation, Stability analysis using Hurwitz's criterion, Routh stability criterion and its application in special cases. Nyquist stability criterion and stability margin. Polar plots.

Unit4: Root Locus [6 hours]

Definition of root locus, Rules for plotting root loci, Construction of Root Loci, Angle and magnitude condition for stable systems. Concept of Inverse root locus, Root contour, stability analysis using root locus. Effect of addition of poles and Zeros. Concept of PID Controller, Functions of PID Controller.

Unit5: Frequency Domain Analysis [8 hours]

Introduction ,Frequency domain specification, Correlation between time and Frequency domain responses, Bode plot, Determination of gain and phase margin from Bode plot, Effect of gain variation and addition poles and zeros on Bode plot ,Determination of transfer function from Bode plot, Compensator design using Bode plot, Lead, Lag, Lag-Lead compensator.

Unit6: State Space Concept [6hours]

Concept of state and state variable, state equation of linear time-invariant and continuous data system. Matrix representation of state equation, Conversion of state variable model to transfer function, Canonical form, Jordan Canonical form, Solution of state equations, Concept of controllability and observability.

Text Books:

- 'Modern Control Engineering' by Katsuhiko Ogata, Prentice Hall of India Pvt Ltd.
- 'Control system Engineering' by I J Nagrath and M Gopal, New Age International Publishers,5Th Edition.
- 'Automatic Control system' by Benjamin C.Kuo, Prentice Hall of India Pvt Ltd.7th Edition, 1995.
- 'Control systems-Principles and design' by M. Gopal 2nd Edition 2002.
- 'Control system Engineering' by Norman Nise, John Willey & Sons, 4ndEdition 2004.
- 'Modern Control System' by "Richard .C. Dorf, Robert H Bishop, Eighth Edition, Addison Wesley 1998.

Reference Books:

- "Controll System" by Smarajit Ghosh, Published by Dorling Kindersley (India) Pvt, Ltd, Licensees of Pearson Education in South Asia.2nd Edition, 2009.
- 'Linear Control System analysis and design (conventional and modern) by john J.D'Azzo, C.H. Houpis, McGraw Hill International Fourth edition.
- 'Design of feedback Control Systems' by Stefani, Savant, Shahin, Hostetter, Saunders College Publishing international, Fourth Edition.
- "Control System Engineering System" By Dr. Rajeev Gupta
- "Control Engineering" By K. P. Ramachandran.
- " Control System" By Varmah
- "Control System Engineering" By Palani

Term Work

The term work shall consist of a record of minimum EIGHT experiments from the following list and A ***Mini project*** related to subject.

1) Study of potentiometers: Modelling, transfer function and Characteristics.
2) Study of synchros: Modeling, transfer function and Characteristics.
3) Study and plotting of characteristics of rotary optical encoder.
4) Determination of transfer function of:
   i) Armature-controller D.C. servo motor.
   ii) A.C.servo motor.
5) Time domain analysis of a second order system.
6) Computer aided plotting of root-locus.
7) Computer aided plotting of Nyquist and Bode-plots.
8) Study of Regulator system.
9) Study of a process control system and use of a PID controller.
10) Computer aided design of a liner control system.

EEP/305- Elective II- Special Purpose Electrical Machines

Teaching Scheme	Examination Scheme
Theory: 4 Hrs/Week	Theory Paper: 80 Marks
Practical: 2 Hrs/Week	Internal Assessment: 20 Marks
	Practical : 50 Marks

Special electrical machines as an extension to the study of basic electrical machines.:

OBJECTIVES

To impart knowledge on Construction, principle of operation and application of synchronous reluctance motors. Stepping motors, permanent magnet brushless D.C. motors. permanent magnet synchronous motors, Isolation Transformer, Earthing Transformer ,Pulse Transformer, Furnace Transformer, Rectifier smelter Transformer. Construction, principle of operation and application of Welding Transformers like ARC welding X-er, MIG welding X-er, Spot Welding X-er; Construction, principle of operation and application of High frequency Transformer. Connect conventional single -phase transformer as buck or boost autotransformer and measure currents and voltages. specific use and application.

ROTATING MACHINES

UNIT-I **[10 hour]**

Induction generators: self excitation requirements, voltage regulation, different methods of voltage control, application to mini and micro hydel systems. Doubly fed induction machines: operation in generation mode, application to grid connected wind and *mini/micro hydel systems. Switched* Reluctance Motor: Construction, operation and applications. Brushless DC Machines: construction operation and applications. Linear Machines: Linear Induction Machines and Linear

UNIT-II **[06 hour]**

Fractional Horse Power Synchronous Motors: Construction, operation, and applications.
Synchronous reluctance motors: Constructional features Types: Axial and radial air gap motors Operating principle, applications.
Stepping motors: Hybrid stepper motors, Single and multi stack configurations.
Permanent magnet synchronous motors: Principle of operation & applications.

STATIC MACHINES

UNIT- III **[08 hour]**

Transformer for special purposes - pulse, high frequency, rectifier, welding, isolation. Connect conventional single -phase transformer as buck or boost autotransformer to and measure currents and voltages. Specific uses and applications.

UNIT-IV **[08 hour]**

Electric Heating and Welding:
Electric Heating – Advantages, Methods, Resistance ovens, Induction heating, Dielectric heating, Arc Furnace, Induction Furnace. Heating of buildings; Electric Welding Types: – Resistance and Arc Welding, MIG welding, TIG welding, and Welding Equipments.

UNIT-V **[08 hour]**

Electrolytic Process: Principle of Electro-deposition, Laws of Electrolysis, Extraction and Refining of Metals, Electro-plating, Factors affecting electro-deposition, Manufacture of chemicals, Application of Electrolysis.

Term work:
The term work shall consist of minimum **eight** Experiments.

1. Load Characteristics of Variable Reluctance Motor.
2. Load Characteristics of Stepper Motor.
3. Load Characteristics of Brush less DC Motor.
4. Load Characteristics of FHP Synchronous Motor.
5. Load Characteristics of PMDC Motor.
6. Input V/I Characteristics of Single Phase ARC welding Transformer.
7. Study of Construction & Operation of MIG welding Transformer.
8. Study of Construction & Operation of TIG welding Transformer.
9. Study of Construction & Operation of ARC Furnace.
10. Study of Construction & Operation of Induction Furnace.
11. Study of Construction & Operation of Rectifier Transformer.
12. Study of Construction & Operation of Electro Plating Bath.

TEXT BOOKS

1. D.P. Kothari and I J Nagarath : 'Electric Machines,' Third Edn, Tata McGraw-Hill Pub.,2004.
2. J.B. Gupta: Theory and Performance of Electrical Machines, Fourteen Edn, S. K. Kataria& Sons, 2006.
3. E. Fitzgerald, Charles Kingsley and Stepen D. Umans: 'Electric Machinery', Sixth Edition, Tata McGraw-Hill Pub., 2002.
4. Syed A Nasser "Electric Machine and Transformer", New York, Macmillan, 1984.
5. M G Say, "Alternating Current Machines", ELBS, 1986
6. Fitzgerable, C Kingsley, S D Umans, "Electric Machinery", TMH, 1992
7. M McPherson and R D Laramore "An Introduction to Electrical Machines and Transformer", John Wiley, 1990

REFERENCE BOOKS

1. T. Kenjo, "Stepping Motors and Their Microprocessor Controls", Clarendon Press London, 1984.
2. T. Kenjo and S. Nagamori, "Permanent Magnet and Brushless DC Motors", Clarendon Press, London, 1988.
3. P.P. Aearnley, „Stepping Motors –"A Guide to Motor Theory and Practice", Peter Perengrinus, London, 1982.

Books:

1. Microprocessor Architecture, Programming and Applications with 8085- Ramesh Gaonkar, Penram International
2. Microcomputer and Microprocessors : The 8080,8085 ans Z-80 Programming, Interfacing and troubleshooting – John E. Uffenbeck
3. Microprocessor and Microcontroller Fundamentals- The 8085 and 8051 Hardware and software- William Kleitz
4. Microprocessor and programmed logic – K.C. Short,2nd Edition, Pearson Education.
5. Fundamentals of Microprocessor and Microcomputers- B.Ram. TMH
6. Microprocessors and Peripherals B.Venkatramani,TMH

Practical Exam:

The practical exam will be of three hours duration. It will consist of one experiment conducted during the course and oral exam based on the syllabus.

List of Practicals

1. 6/8 Assembly Language Programs which should include 8 bit and 16 bit operations, BCD operation and Block data transfer technique
2. Interfacing of I/O Devices : LED, Keyboard, LCD, Sevensegment LED (at least two)
3. Interfacing of stepper Motor
4. Interfacing of Converters ADC 0808/0809 and DAC 0808
5. Interfacing using 8279,8259,8253,8257(at least two)

EEP/305- Elective II- DIGITAL ELECTRONICS

Teaching Scheme	Examination Scheme
Theory: 4 Hrs/Week	Theory Paper: 80 Marks
Practical: 2 Hrs/Week	Internal Assessment: 20 Marks
	Practical : 50 Marks

Unit 1:Number System and logic Family: [6 Hrs.]

Binary number system, Signed binary numbers, Binary arithmetic, Decimal number system, Hexa number system, Arithmetic operations using 1's complement, 2's complement, BCD code, Excess-3 co Logic gates and switching functions, Basic gates: AND, OR, NOT, EX-OR, EX-NOR, NAND, NOR. Introc family RTL, ECL, TTL, I2L, PMOS, NMOS,CMOS, Characteristics of: TTL, CMOS. Representation of logic e

Unit-2: Combinational Logic Design : [8 Hrs.]

Boolean Algebra Rules, De Morgan's theorem, Boolean algebra, Representation of logic functions usi Simplification of Logic functions using Karnaugh Map, Don't care conditions, Design of combinatio blocks: Half-adder, Full-adder, Half-subtractor, 2 bit comparator, Full subtractor, Binary to Gray and (

Unit-3: Data-Processing Circuits : [6 Hrs.]
Multiplexers, Demultiplexers, multiplexers/Demultiplexers Trees, BCD-to-Seven-segment Decoders, I Checkers, Comparator, Analog to digital conversion and its classifications, Digital to analog con ADC0808 and DAC0808 Parallel Adder (IC7483), Arithmetic logic Unit.

Unit-4: Sequential Logic Circuit [8 Hrs.]
Flip-Flops: Memory cell, R-S, J-K, Race around condition, Master-slave J-K, D, T, excitation table, flip-fl Counter: Designing of asynchronous and synchronous counters, 4 bit up/down, MOD- N cou Registers:SISO, SIPO, PISO, PIFO Shift register.

Unit-5: Synchronous and Asynchronous Sequential Circuits [6 Hrs.]
Synchronous Sequential Circuits: General Model, Classification, Design, Use of Algorithmic State Ma Sequential Circuits.
Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits State Machi Circuits, Design of Combinational and Sequential circuits.

Unit-6: Semiconductor Memories and PLD [6 Hrs.]
Semiconductor Memory: Memory organization and operation, Expanding memory size, classification RAM, ROM, EPROM, SRAM, DRAM, flash memory. Programmable Logic Devices: Introduction to Prog Logic Arrays (PLA), Programmable Array Logic (PAL).

List of Practical's.(any 8)

1. To study and verify Logic Gates.
2. To study and verify Combinational circuits.
3. To study and verify Flip flops.
4. To study and verify digital converter.
5. To study and verify Multiplexer and Demultiplexers.

6. To study and design MOD 10 counter.

7. To study and verify encoder and decoders.

8. To study and verify Logic Families.

9. To study semiconductor memories.

10. To study PLDs.

Text Books:

1. R. P. Jain, “Modern Digital Electronics”, 3rd Edition, TMH publication, 2003.
2. Donald P Leach, Albert Paul Malvino&GoutamSaha, “Digital Principles and Applications”,7th Edition, TMH publication, 2011.
3. Jaydeep Chakravorty, “ Digital Electronics and Logic Design, Universal Press.

Reference Books:

1. Stephen Brown, ZvonkoVranesic, “Fundamentals of Digital Logic Design with VHDL,” 2nd Edition, Tata McGraw Hill, 2005.
2. Charles H. Roth, Fundamentals of Logic Design, Jr., 5th Edition, Cengage Learning, 2004.
3. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss “Digital Systems Principles and Applications,” 10th Edition, Pearson Education, 2007.
4. M. Morris Mano: Digital Logic and Computer Design, 10th Edition, Pearson Education, 2008.

EEP/305- Elective II- Communication Engineering

Teaching Scheme	Examination Scheme
Theory: 4 Hrs/Week	Theory Paper: 80 Marks
Practical: 2 Hrs/Week	Internal Assessment: 20 Marks
	Practical : 50 Marks

Content:

Unit 1: Introduction to analog communication: Basic schematic of communication systems, Simplex and duplex systems, Modes of communication, broadcast and point to point communication, Necessity of modulation, Modulation and demodulation concepts (AM, FM, PM), TDM and FDM concepts, concept of noise. (8 hr)

Unit 2: Digital and data communication: Sampling theorem, coding and decoding, Pulse modulation, FSK, PSK, and Modem. OSI reference model, Internet protocol, Packet switching. (8 hr)

Unit 3: Optical fiber communication: OFC techniques and advantages, types of optical fibres and construction, propagation in OF and modulation techniques. (6 hr)

Unit 4: Satellite communication: Overview of Satellite communication, Kepler's three laws of planetary motion, orbit parameters. (4 hrs)

Unit 5: Historic Developments in Data communication over Power lines, Remote energy metering protocols, Communication systems in Power stations, Modulation schemes for PLC, Communications in Power distribution grid. (7 hr)

Unit 6: Communication Technologies for smart grid: Fiber Optical Networks, WAN based on Fiber Optical Networks, IP based Real Time data Transmission, Substation communication network, Zigbee. (7 hr)

References:

1. Electronic Communication Systems, by Davis Kennedy, McGraw-Hill; 4th edtion edition (1992)
2. Principles of Electronic Communication Systems 4th Edition by Louis Frenzel McGraw-Hill.
3. Wayne Tomasi, Electronic Communication Systems, 4th Edition, Pearson Education, 2002.
4. Gary Miller, Modern Electronic Communication, 7th Edition.
5. Andrew S. TanenBaum, Computer Networks, 3rd Edition.
6. William C. Y. Lee, Mobile Cellular Telecommunication, 2nd Edition.
7. Klaus Dostert, Power Line Communications, Franzis Verlag.
8. IEC 62056, International Electricity Metering Protocol.
9. EkanayakeJ.,Jenkins N., Liyanage K., Wu, J., Yokoyama A., Smart Grid: Technology and applications, Wiley Publications.
10. James Momoh, Smart Grid: Fundamentals of Design and Analysis, IEEE Computer, Society Press (2012).

EEP/ BSH331-Communication Skill-II

Teaching Scheme	Examination Scheme
Practical: 2 Hrs/Week	Term Work : 50 Marks

Prerequisite:

1. Basic Knowledge of Soft Skills
2. Good understanding of English

Objectives:

1. To imbibe leadership skills
2. To develop interpersonal Skills
3. To introduce corporate etiquettes
4. To imbibe team skills

CONTENTS

Unit 1: Understanding self and Goal Setting (5 Hours)

- Self-Assessment: Understanding Self Core Competency (SWOT/SWOC)
- Long term and short-term Goal Setting
- Execution Skills

Unit 2: Interpersonal Skills (6 Hours)

- Interpersonal Communication
- Conflict Management
- Problem Solving
- Decision Making
- Persuasion and Influence

Unit 3: Group Dynamics and Team Building (4 Hours)

- Group Vs Team
- Team Building
- Team Work
- Developing Leadership Skills

Unit 4: Corporate Etiquette (5 Hours)

- Clothing Etiquette, Personal hygiene and grooming
- Time Management
- Influencing Skills (Impression)
- Balancing personal and professional Life
- Ethics, Values and Laws

Text Book:

1. The Ace of Soft Skills (Gopalaswamy Ramesh) Pearson Publication

Reference Books:

1. Execution; :Ram Charan
(Publisher: Crown Business; 1 edition (June 15, 2002)
Language: EnglishISBN-10: 0609610570ISBN-13: 978-0609610572

2. Laws of Teamwork : John C Maxwell

3. Master of Business Etiquette: Cyrus Gonda
(Author: Cyrus Gonda, Publisher EMBASSY BOOKS, 2017, ISBN 9385492721, 9789385492723)

4. Goals :
(Author: Brain Tracy ISBN: 1-57675-235-6Published by Berrett-Koehler Publishers, Inc)

5. Interpersonal Skills at work :
(Author: John Hayes Second Edition: Routledge)

6. People Smart :
(Author: Freda Hansburgby Berrett-Koehler Publishers, Inc)

Term Work Assessment (50 marks):

The term work shall consist of internal online examination of 50 Marks, conducted at institute level. The marks of the examination shall be forwarded to the University.

EEP/351- Electrical Machine Design

Teaching Scheme	Examination Scheme
Theory: 4 Hrs/Week	Theory Paper: 80 Marks
Practical: 2 Hrs/Week	Internal Assessment: 20 Marks
	Practical : 25 Marks

OBJECTIVES

To impart knowledge on Design of Basic Electric machines, and devices. Design Principles according to f operation and application of Electrical Machines. Thermal & Magnetic considerations, in Designs of Motors and Transformer according to Construction, principle of operation and application.

UNIT-I

Design Base: Principles of design, design factors, Specifications, Standardization, Rating, Performance requirements, Design limitations, Reference Standards, Different approaches.

UNIT-II

Calculation of Ampere-Turns for flux distribution in rotating machines. Carter's co-efficient and its' significance. air-gap flux distribution.

UNIT-III **[8Hrs]**

Transformer Design (Part-I):-

Modes of heat generation, various methods of cooling, temperature-rise, heating / coolingcycles, heating time constant, cooling time constant, maximum temperature rise and theirestimation. Types, constructional features, Specifications as per IS 2026, Output equation, design of main dimensions, core, yoke, windings (including selection).

UNIT-IV. **[8Hrs]**

Transformer Design (Part-II) :-

Evaluation of resistance, leakage reactance of windings, no-load current, estimation of losses, design of tanks, calculation of mechanical forces developed under short circuit conditions, measures to overcome this effect

UNIT-V. **[7Hrs]**

Design of 3-phase Induction Motor (Part-I):-

Constructional features, types of ac windings, output equation, specific electrical and magnetic loadings, ranges of specific loadings, turns per phase, number of stator slots, calculations for main dimensions and stator design parameters.

UNIT-VI **[8Hrs]**

Design of 3-phase Induction Motor (Part-II):-

Selection of length of air gap, factors affecting length of air gap, design of rotor, Unbalanced magnetic pull and its estimation, harmonic field effect on the performance of3-phase induction motor, suitable combinations of stator & rotor slots, design of squirrel cage and wound rotor.

UNIT-VII

Design of Electrical devices:

Design of heating coil, Choke coil, Electromagnets.

Term work:

The term work shall consist of three drawing sheets (Minimum one sheet to drawn in AutoCAD.)

1. Details and assembly of 3- phase transformer with design report.
2. Details and layout of AC winding with design report.
3. Assembly of 3- phase induction motor.(only sheet)
4. Report based on Industrial visit to a manufacturing unit.(Transformer or Induction motor)

Text Books :

1. A.K.Sawhney – A Course in Electrical Machine Design' 10th Edition, - Dhanpat Rai and sons New Delhi.
2. M.G. Say – Theory & Performance & Design of A.C. Machines, 3rd Edition, ELBS London

Reference Books

1. K.L. Narang , A Text Book of Electrical Engineering Drawings, Reprint Edition : 1993 / 94 – SatyaPrakashan, New Delhi.
2. A Shanmugasundaram, G. Gangadharan, R. Palani, - Electrical Machine Design Data Book, 3rd Edition, 3rd Reprint 1988 - Wiely Eastern Ltd., - New Delhi
3. Vishnu Murt

EEP/352– TESTING AND MAINTENANCE OF ELECTRICAL EQUIPMENTS

Teaching Scheme	Examination Scheme
THEORY: 4 Hrs/Week	Theory paper: 80 Marks

OBJECTIVES

To impart knowledge on Testing of Electrical Equipments used in power systems. Fault finding techniques for Basic Electric machines, like Transformers and Induction motors. Remedies on faults. Principles of testing methods, their way of operation and application, for different Electrical Machines. Thermal & Magnetic considerations, in Testing of Motors and Transformer according to Construction, operation and application.

Unit I. General Introduction (4 Hrs)

a) Objectives of particular testing, Significance of ISS, concept of tolerance, routine test, type test, special tests

b) Method of tastings, direct, indirect, distractive and non-distractive testing methods.

C) Concept of routine, preventive and breakdown maintenance, advantages of preventive Maintenance, Introduction to Total procedure maintenance [TPM].

UNIT-II **(10 Hrs.)**

Types of faults / errors mainly in Power Transformers and rectification of faults.

a) **Faults During manufacturing:** Description and causes of 'Reasons' behind development of faults. Like [Turn to turn short/open ckt., coil to coil short / open ckt. Winding to winding short circuit, winding to body short /over leakage current, Magnetic imbalance, wrong placement of coils in winding, Oil properties of filled oil faults due to loose /wrong/in-sufficient stacking of core, transformer has excessive vibrations, failure of winding (Turn to turn or layer to layer insulation) paper insulations]. Effect of each reason on transformer, testing method as per ISS, and equipment used to identify each reason.

b) **Faults During operation:** Description and causes of 'Reasons' behind development of faults. like 1.Transformer gets over heated, 2. Not supplying power with full load capacity. (We should not consider dead short circuit during operation because it need not be tested.); 3. Radiator choking, Breather silica jell bad condition, leakages from tank joints, Loose connections at terminals. Conservator top-up need, contamination of transformer oil properties, transformer de-hydration need etc. Effect of each reason on transformer, testing method as per ISS, and equipment used to identify each reason.

UNIT-III **[10Hrs]**

Types of faults / errors mainly in Induction motors and rectification of faults.

a) **Faults During manufacturing:** Description and causes of 'Reasons' behind development of faults. Like [Turn to turn short/open ckt., coil to coil short / open ckt. Winding to winding short circuit, winding to body short /over leakage current, Magnetic imbalance, wrong placement of coils in winding, faults due to loose /wrong/in-sufficient stacking of core, rotor dynamic unbalancing, rotor is not aligned, failure of winding (Turn to turn or layer to layer insulation) paper insulations, blow holes in casting of motor body, cracks in welded motor body etc.]. Effect of each reason on motor, testing method as per ISS, and equipment used to identify each reason.

b) **Faults During operation:** Description and causes of 'Reasons' behind development of faults. like 1.Moter gets over heated, 2. Not supplying power with full load capacity. (We should not consider dead short circuit during operation because it need not be tested.); 3. Rotor had bend, rotor conductor broken / ooze out, Bearings in jammed/warned out condition, magnetic flux leakages from stator core / body joints, Loose connections at terminals. Use of wrong duty cycle or mounting type motor. Motor has excessive vibrations. Effect of each reason on motor, testing method as per ISS, and equipment used to identify each reason.

UNIT-IV. **[8Hrs]**

Introduction and preliminaary functions of following equipments for testing: and fault finding by using these equipments:

1. Industrial sono-graphy (Ultra sonic testing): – for detection of internal cracks / blow holes / voids in Solid metallic /insulating materials.
2. Industrial x-ray / radiography: for location of internal sc /oc and cracks / blow holes / voids in Solid metallic /insulating materials.
3. Impregnation plants for polymer insulating materials.
4. E.M.Swinging [Electro Mechanical Swing] graph machine for excessive vibrations measurement.

UNIT-V. **[8Hrs]**

Testing Methods: Conceptual understanding to detect the fault by test results of:-

1. Megger Testing [How, When & Why?].
2. Resistance Testing [How, When & Why?]
3. Turns Ratio Testing [How, When & Why?]
4. Sonography [How, When & Why?]
5. Radiography [How, When & Why?]
6. Acidity in Xer- oil. [How, When & Why?]
7. Heat Run testing [How, When & Why?]
8. DGA- Dissolved Gases Analysis. [How, When & Why?]
9. HV withstand test [How, When & Why?]

Text/Reference Books

1. B. L Therja" Electrical Technology Vol- II' S.Chand& Co, New Delhi
2. B.V.S.Rao "Operations and Maintenance of Electrical Machine" Vol-I & II Media Promoters &Publisher Ltd Mumbai
3. 'Electrical Equipments Testing & Maintenance' by UMORSHAW TAILER , English longman publications, LCUE [Low cost Univ.Editionfor Asia.] New Delhi.
4. 'Testing of Induction motors' by S. Swaminathan, Tirupati Publications Banglore.
5. 'Transformers' BHEL publications –TataMc Graw hills New Delhi.
6. Hand book on 'Testing of Electrical Equipments': Siemens Ltd.
7. S.L.Uppal "Electrical Power", Khanna publication New Delhi
8. M.G.Say,"The performance and design of alternating current machine",CBS publishers & distributors
9. Relevant I.S. Codes.

Term Work: [Minimum '8'- Expts. From the list below.]

1. Testing and fault finding of 1-ph electrical motor, and study of its Re-winding process in details till its operation after re-winding.
2. Testing and fault finding of 3-ph electrical motor, and study of its Re-winding process in details till its operation after re-winding..
3. Testing and fault finding of submersible multistage electrical motor, and study of its Re-winding process in details till its operation after re-winding.
4. Testing & measurement of Earth resistance for your Lab./Building .
5. Testing and maintenance of 3-phase induction motor starter.
6. Testing and maintenance of control panel.
7. Testing and maintenance of 1-ph Transformer.
8. Maintenances of Distribution Transformer & substation earthling.
9. Study of cable jointing.
10. Testing and maintenance of 3-ph Transformer.
11. Study of Earth mat for 33kV substation.
12. Visit to TESTING department of Electrical utility.
13. Visit to TESTING department of Transformer Industry.
14. Visit to TESTING department of Electric motor Industry.

EEP/353- Power Electronics - I

Teaching Scheme	Examination Scheme
Theory: 4 Hrs/Week	Theory Paper: 80 Marks
Practical: 2 Hrs/Week	Internal Assessment: 20 Marks
	Practical : 50 Marks

Unit:1 Power Devices **[8 hours]**

Structure, Characteristics, Switching actions, Trigger requirements, Ratings, Protections and Areas of application of SCR, TRIAC , GTOs, IGBT, Power MOSFET and MCTs.

Unit:2 AC-DC Converters **[8 hours]**

Single phase and three phase half (semi) and full converters: Quadrants of operation, circuit configurations, working, performance parameters and input-output waveforms for R, R-L and RLE loads. Dual converter in circulating and non-circulating current modes.

Unit:3 DC-DC Converters **[6 hours]**

Step-up and step-down configurations, CLC and TRC techniques, PWM and FM techniques. Practical transistorized chopper circuits: working, control, output waveforms, continuous and discontinuous current conduction.

Unit:4 DC-AC Converters **[8 hours]**

Single phase and three-phase thyristorised bridge circuits, output waveforms for R and R-L loads. PWM techniques-Single, Multiple and Sinusoidal PWM.

PWM Inverters: Principle of operation, Performance parameters, Working of single phase and three phase circuits, Current Source Inverter, ASCCSI.

Unit:5 PWM Converters **[6 hours]**

Principle of operation, circuit configurations, performance waveforms and applications of Switched Mode Converters (buck, boost and buck-boost) Switched Mode Rectifiers, Power conditioners and UPS.

Unit:6 AC-AC Converters **[6hours]**

AC controllers; single phase & three phase, Cycloconverters; single phase to single phase, three phase to three phase, three phase to single phase, half-wave bridge configuration, four quadrant operation.

Text Books

1. Power Electronics by M.H. Rashid, , 2nd Ed, PHI Pub. 1994.

2. Power Electronics by Mohan, Undeland, Robbins, , 2nd Ed, John Willey & Sons, 1995

3. Power Electronics by B.W.Williams, John Willey,1975.

4. "Power Electronics" By PC Sen

5. "Power Electronics" By Khanchandani/Singh

Reference Books:

- "Elements of power electronics" By. Philip T. Krein.
- "Power Electronics" by V. R. MOORTHI.
- Power Semiconductor Circuits by S.B.Dewan and Straughan, John Willey
- Power Electronics and AC Drives' by B.K.Bose, Pearson
- SPICE for Power Electronics by M.H.Rashid, McGraw Hill International.

The laboratory consists of minimum EIGHT experiments from following list.

anyTHREE from 1 to 4 THREE from 5 to 8 and TWO from 9 to 11.

1. SCR Turn-on methods.
2. SCR Commutation methods.
3. IGBT / MOSFET Drivers.
4. TRIAC –Phase control.
5. Single phase /three phase Converter
6. D.C.Chopper
7. Single phase / three phase Thyristorised Inverter
8. PWM Inverter
9. Simulation of Converter / Chopper
10. Simulation of PWM Inverter
11. Switched mode Converter / Rectifier

EEP/354- Microcontroller and Applications

Teaching Scheme	Examination Scheme
Theory: 4 Hrs/Week	Theory Paper: 80 Marks
Practical: 2 Hrs/Week	Internal Assessment: 20 Marks
	Practical : 50 Marks

1. Advanced processor **(08 Hours)**

Introduction to 16 bit Intel 8086 Microprocessor, Architecture, Addressing Modes, Memory organization, Instruction set and assembly language program.

2. Architecture Of 8051: **(08 Hours)**

Comparison of Microprocessor and Microcontroller - Block diagram of Microcontroller, Functions of each block, Pin details of 8051, ALU,ROM,RAM, Memory Organization of 8051, Special function registers – Program Counter, PSW register, Stack, I/O Ports, Timer, Interrupt, Serial Port, Oscillator and Clock. Overview of 8051 family.

3. Instruction Set And Programming Of 8051: **(06 Hours)**

Instruction set of 8051, Classification of 8051 Instructions - Data transfer instructions, Arithmetic Instructions, Logical instructions, Branching instructions, Bit Manipulation Instructions. Assembly Language Programming.

4. Programming of On-Chip Peripherals: **(06 Hours)**

I/O Bit addresses for I/O and RAM – I/O programming – I/O bit manipulation programming. Timer Programming 8051 Timers – Timer 0 and Timer 1 registers – Different modes of Timer – Mode 0 Programming – Mode 1 Programming - Mode 2 Programming - Mode 3 Programming - Counter programming – Different modes of Counter – Mode 0 Programming – Mode 1 Programming - Mode 2 Programming - Mode 3 Programming (simple programs)

5. Serial Communication & Interrupt: **(06 Hours)**

Basics of Serial programming – RS 232 Standards - 8051 connection to RS 232 – 8051 Serial Communication Programming – Programming 8051 to transmit data serially - Programming 8051 to Receive data serially. **Interrupt:** 8051 Interrupt s – Programming Timer Interrupts – Programming external hardware interrupts – Programming the serial communication interrupt – Interrupt priority in 8051 (simple programs).

6. Interfacing Techniques: **(06 Hours)**

Interfacing external memory to 8051, 8051 interfacing with the 8255,Programming of Relays, Sensor interfacing, ADC interfacing, DAC interfacing - Keyboard interfacing, Seven segment LED Display Interfacing, Stepper Motor interfacing, DC motor interfacing using PWM.

Books:

1. Badri Ram "Advance Microprocessor and Interfacing Techniques" TMH
2. Barry B Brey The intel Microprocessor 8086 to Pentium architecture programming and interfacing.
3. The 8051 Microcontroller and Embedded Systems using Assembly and C by Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D.MacKinlay, 2006 Pearson Education Low Price Edition.
4. Microprocessor and Microcontroller by R.Theagarajan, Sci Tech Publication, Chennai.
5. The 8051 Microcontroller Architecture Programming and Applications, 2nd Edition, Penram International Publishers (I), 1996. by Kenneth J.Ayala
6. Programming customizing the 8051 Microcontroller by Myke Predko, Tata McGraw Hill.
7. "The 8051/8052 Microcontroller" By Craig Stainer.

Practical Exam:

The practical exam will be of three hours duration. It will consist of one experiment conducted during the course and oral exam based on the syllabus.

List of Practicals

1. Assembly Language Programs (at least 6/8)
2. Interfacing of Discrete LEDs: Blinking LEDs, Running Lights, Binary counter
3. Displaying numbers on Seven segment LEDs
4. Use of Timer to generate a delay.
5. Generating square wave on port pins.
6. Display message on LCD screen.
7. Programs Based on interrupts
8. Interfacing of stepper Motor
9. Interfacing of Converters ADC 0808/0809 and DAC 0808

EEP/355-Elective-III- Energy Conservation and Audit

Teaching Scheme	Examination Scheme
Theory: 4 Hrs/Week	Theory Paper: 80 Marks
Practical: 2 Hrs/Week	Internal Assessment: 20 Marks
	Practical : 50 Marks

Unit 1:- Global Environmental concerns & Issues (5 Hours)

Ozone layer depletion & its effects; climate change problems & response; Global warming, sources of GHG's; Global warming potentials; climate change implications; Kyoto protocol; UNFCCC (United Nations Framework Convention on Climate Change); CDM; Carbon markets; Emissions-Trading, ISO 50001; Role of Renewable & non-conventional energy sources.

Unit 2:- Energy Audit (5 Hours)

Energy Conservation Act 2001; Designated consumers , Energy Policy, BEE & its role in energy conservation; Energy Audit – need, types, methodology, steps involved in Energy Audit; Energy-Costs, Bench marking & Energy performance, Measurement instruments for Energy Audit; Energy Manager-Duties & responsibilities.

Unit 3:- Energy Efficiency & Optimization- Thermal- Mechanical Systems (10Hours)

Laws of Thermodynamics; Steam boilers- types; fuel atomization; Boiler efficiency by Direct & Indirect methods; Energy efficiency opportunities in boilers, HVAC & refrigeration system, compressed air system, pumps, pumping systems, Affinity Laws, cooling towers, fans & blowers; Co- Generation- need, principal of cogeneration, technical options & primes movers for cogeneration; Waste Heat Recovery System- devices- Recuperators, heat wheels, heat pipe, economizer, waste heat recovery boiler.

Unit 4 :- Energy Efficiency & Optimization in Electrical Systems (10Hours)

Energy efficient technologies in electrical systems; Electricity billing; load management; maximum demand control; PF improvement & its benefits; APFC; energy efficient transformers; T & D losses; Harmonics; Energy efficient Motors; soft starters; lighting system; electronic ballasts; Energy Sector Reforms; Electricity Act 2003.

Unit 5:- Economic Analysis & Financial Evaluation (5Hours)

Economic Analysis & Financial Evaluationof Energy Conservation Proposals; Cash Flow Model; Time Value of Money; Financial Analysis- Simple payback; Return on Investment (ROI); Net-Present Value; Internal Rate of Return (IRR); Profitability Index, Uncertainty & sensitivity analysis.

Unit 6:- Case Studies (5hours)

Thermal & Electrical Energy Audit of Thermal Power Station, Steel Plant, Cement Plant, Textile Plant, Chemical- Petrochemical Complex, Engineering Industry, Buildings & Commercial Establishments.

Text Books:-

1. "Industrial Energy Conservation"
   - Charles M Gottschalk, John Wiley & Sons, 1996
2. " Energy Management Principals"
   - Craig B Smith, Pergamon Press
3. " 4- Books for National Certification Examination for Energy Managers & Energy Auditors- Published By BEE"

References:-

1. " Optimizing Energy Efficiencies in Industry"
   - G GRajan Tata McGraw Hill, 2001
2. " Energy Management"
   - Paul O'Callaghan, Tata McGraw Hill Co.
3. "Energy Management Handbook"
   - Wayne C Turner, The Fairmount Press, Inc, 1997
4. " Energy Technology"
   - S Rao& B BParulekar, Khanna Publishers, 1999

Term Work:-

Term work shall consist of

A. Study Experiment on any five
   1. To study the performance assessment of HVAC & Refrigeration system.
   2. To study the performance assessment of Co-generation system.
   3. To study the energy performance assessment of boilers. Indirect method of efficiency of boilers.
   4. Application of Non-conventional & Renewable Energy sources.
   5. Power Factor improvement & benefits.
   6. Energy performance assessment of motor & variable speed drives.
   7. Energy performance assessment of Lighting system
   8. Financial Evaluation of Energy Conservation Project

B. Student should prepare & submit a detailed energy audit report of any one of Industrial organization mention in unit 6. Local industrial visit should be arranged to study energy conservation & optimization methods.

EEP/355-Elective-III- INDUSTRIAL MANAGEMENT

Teaching Scheme	Examination Scheme
Theory: 4 Hrs/Week	Theory Paper: 80 Marks
Practical: 2 Hrs/Week	Internal Assessment: 20 Marks
	Practical : 50 Marks

UNIT 1: (08 hours)

Industrial Management: Principles and Importance of management, Functions of management, Decision making process.
Operations Management: Production concept, production planning and control, manufacturing systems: types and characteristics, plant layout types, need and characteristic, salary and wage administration.

UNIT 2: (08 hours)
Human Resource Management: Concept, Objective and Functions of HRM, Principles of good HR policy, Incentives: types and characteristics.
Financial Management: Types of Capital, Source of finance, Institutions building Industrial finance, Taxation policies, Taxes: direct and indirect.

UNIT 3: (08 hours)
Marketing Management: Functions of Marketing, Market research, Sales Management, Sales organization and its functions, sales forecasting, the selling and marketing concept.
Network Analysis: Network Techniques, Terms related to Network Planning, PERT, CPM, Applications of Network Technique.

UNIT 4: (08 hours)
Material Management: Introduction to Material Management, Purchasing, Buying Technique, Purchasing procedure, Inventory control, Inventory Management, Material requirement planning.
Total Quality Management: Definition, Quality obstacles, Benefits of TQM,ISO registration benefits, ISO 9000 series standards, sector specific standards, ISO 9001requirements, Introduction to ISO 14000 series, Testing standards

UNIT 5: (08 hours)
Industrial Acts: Indian factory act, Indian Electricity act, The Workmen's compensation act, Consumer Protection act.
Engineering Economics: Meaning of economics, difference between value and price, law of demand and supply, demand forecasting methods, Banks: functions and types, RBI, SEBI, modern concepts like SEZ, PPP, BOT.

UNIT 6: (08 hours)
Management Information Systems: Introduction, Elements, Structure and Requirements of MIS, Decision support system.

Operations Research: LPP (Graphical only), Transportation Problem, Assignment Problem, Inventory Model (EOQ, Stock levels).

REFERENCE BOOKS:

1) Industrial Engineering and Management: O.P. Khanna; Dhanpatrai and Company
2) Management Information Systems by G.B. Davis, M.H. Olson: McGrawhill; International Edition.
3) Total Quality Management by D.H. Besterfield, C.B. Michana& others; PHI Pvt. Ltd.
4) ISO 900 quality systems: A. N. Singh; Dolphin Book N Delhi.
5) Business organization and management: M.C. Shukla; S. Chand.
6) Operations Research by S. D. Sharma.

TERMWORK:

Term-work shall consist of minimum EIGHT experiments from above UNITS.

EEP/355-Elective-III- DIGITAL SYSTEM DESIGN

Teaching Scheme	Examination Scheme
Theory: 4 Hrs/Week	Theory Paper: 80 Marks
Practical: 2 Hrs/Week	Internal Assessment: 20 Marks

UNIT 1: MOS Devices (06 hours)
Introduction to MOST,I-V characteristics of NMOS and PMOS, second order effects-CLM, Body bias, short channel effects-VT roll off, DIBL, Mobility degradation, Transfer characteristics of CMOS inverter, Detailed analysis of CMOS inverter with parasitic.

UNIT 2: CMOS Design (08 hours)
CMOS logic families-static, dynamic including their timing analysis and power consumption, CPL, Pass transistor logic, Transmission gate, circuits using CPL and pass transistor logic.

UNIT 3: Fabrication and Layout (06 hours)
Basic CMOS technology, self aligned CMOS process, N well, P well, Twin tub, Layout of CMOS inverter, Design rules, Verification of layout

UNIT 4: Introduction to VHDL (06 hours)
Introduction, EDA Tool-VHDL, Design flow, Introduction to VHDL, Elements of VHDL, Modelling styles-sequential, structural, and data flow modeling , sequential and concurrent statements

UNIT 5: Circuit Design Using FPGA &CPLD (06 hours)
Function, Procedures, Attributes, Test benches, synthesizable and no synthesizable statements, packages and configurations. The state diagram, modeling in VHDL with examples such as counters, registers and bidirectional bus. Introduction, study of architecture of CPLDs and FPGAs

UNIT 6: Testability (08 hours)
Need of design for testability, introduction to fault coverage, Testability, Design for testability, controllability, absorbability, stuck at fault model, stuck open and stuck short faults, Boundary scan check, JTAG technology, TAP controller, and TAP controller state diagram, scan path, Full and partial scan.

TEXT BOOKS:

1) N. Weste and K. Eshranghian, Principles of CMOS VLSI Design, Addison Wesley.

2) J. Rabaey, Digital Integrated Circuits: A Design perspective, PHI

3) D. Perry, VHDL, 2nd edition, TMH, 1995.

4) Kang S.M, CMOS Digital Integrated Circuits, TMH 3rd 2003.

5) Bushnell Agrawal, Essentials of Electronic Testing for Digital memory and mixed signal VLSI circuits, Kulwar academic publisher.

REFERENCE BOOKS:

1) Boyee and Baker, CMOS, EEE Press.

2) Xilinx FPGA/CPLD data book.

3) VHDL Primer, Addison Weslay Longman,2000, J Bhaskar.

TERMWORK:

Term-work shall consist of minimum EIGHT experiments from above UNITS.

Communication Engineering

Content:

Unit 1: Introduction to analog communication: Basic schematic of communication systems, Simplex and duplex systems, Modes of communication, broadcast and point to point communication, Necessity of modulation, Modulation and demodulation concepts (AM, FM, PM), TDM and FDM concepts, concept of noise. (8 hr)

Unit 2: Digital and data communication: Sampling theorem, coding and decoding, Pulse modulation, FSK, PSK, and Modem. OSI reference model, Internet protocol, Packet switching. (8 hr)

Unit 3: Optical fiber communication: OFC techniques and advantages, types of optical fibres and construction, propagation in OF and modulation techniques. (6 hr)

Unit 4: Satellite communication: Overview of Satellite communication, Kepler's three laws of planetary motion, orbit parameters. (4 hrs)

Unit 5: Historic Developments in Data communication over Power lines, Remote energy metering protocols, Communication systems in Power stations, Modulation schemes for PLC, Communications in Power distribution grid. (7 hr)

Unit 6: Communication Technologies for smart grid: Fiber Optical Networks, WAN based on Fiber Optical Networks, IP based Real Time data Transmission, Substation communication network, Zigbee. (7 hr)

References:

1. Electronic Communication Systems, by Davis Kennedy, McGraw-Hill; 4th edtion edition (1992)
2. Principles of Electronic Communication Systems 4th Edition by Louis Frenzel McGraw-Hill.
3. Wayne Tomasi, Electronic Communication Systems, 4th Edition, Pearson Education, 2002.
4. Gary Miller, Modern Electronic Communication, 7th Edition.
5. Andrew S. TanenBaum, Computer Networks, 3rd Edition.
6. William C. Y. Lee, Mobile Cellular Telecommunication, 2nd Edition.
7. Klaus Dostert, Power Line Communications, Franzis Verlag.
8. IEC 62056, International Electricity Metering Protocol.
9. EkanayakeJ.,Jenkins N., Liyanage K., Wu, J., Yokoyama A., Smart Grid: Technology and applications, Wiley Publications.
10. James Momoh, Smart Grid: Fundamentals of Design and Analysis, IEEE Computer• Society Press (2012).

List of Experiments. (Any 8)
1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.

3. Spectral analysis of AM and FM signals using spectrum analyzer.
4. Pulse Code Modulation and demodulation.
5. Sampling Theorem – Verification.
6. Time division multiplexing Modulation and demodulation.
7. Frequency & Phase shift keying.
8. Study of Kepler's laws of planetary motion.
9. Study of modulation techniques in OFC.
10. Study of substation communication network for smart grid.
11. Study of Modulation schemes for PLC.
12. Study of Remote energy metering protocols.