



SARDAR PATEL UNIVERSITY, BALAGHAT (M.P.)

SCHOOL OF ENGINEERING AND TECHNOLOGY

SYLLABUS

COURSE – DIPLOMA IN ENGINEERING

BRANCH – ELECTRICAL ENGINEERING

SEMESTER - 4th

ACADEMIC SESSION 2024-25

DEE 041

ELECTRICAL MACHINES-II

Course Objectives - This course aims to provide comprehensive knowledge of different types of electric motors and their applications. Students will explore the principles, construction, and characteristics of three-phase induction motors, synchronous motors, and synchronous generators, including their torque equations, efficiency, and control methods. The course covers single-phase induction motors, comparing them with three-phase motors, and delves into the workings of AC commutator motors, such as series and repulsion motors. Practical insights into motor starting, speed control, and synchronization methods are also included, enhancing students' understanding of electrical motor systems.

Unit I.

Three phase Induction Motor - Production of rotating magnetic field, principle, construction, and types of induction motors. Equivalent circuit, torque equation, torque-slip characteristics. Types of starters: DOL, Star-delta, Autotransformer type, rotor resistance type, contactor type starter. Speed control. No load and blocked rotor test, losses, and efficiency. Breaking and applications. Simple numerical.

Unit II

Synchronous motor -Principle, construction, pharos diagram, effect of change in excitation, V curves, synchronous condenser, starting of motors, hunting and its prevention, coding of synchronous machines.

Unit III.

Synchronous generator -Principle, construction, salient and cylindrical rotors, speed-frequency relationship equation, distribution and pitch factor, equivalent circuit, synchronous impedance, regulation, O.C.C. and S.S.C., load characteristics, pharos diagram, parallel operation. Methods of synchronization, power-angle characteristics.

Unit IV.

Single phase induction motors -Principle, double revolving field theory. Types of motors with their construction, characteristics, and applications. Comparison of three phases with single phase induction motors.

Unit V.

AC commutator motors - Introduction, series motor, compensated series motor, commutating poles, universal motor, repulsion motor.



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ELECTRICAL MACHINES-II LAB

List of Experiments

- 1) To Study construction of three phase induction motor.
- 2) To Measure Slip of three phase induction motor.
- 3) To Study starters for three phase induction motor.
- 4) To Study the construction of synchronous machines.
- 5) To Study OCC & ECC of synchronous generator and determination of regulation.
- 6) To plot V-curves for synchronous motor.
- 7) To perform Load test on single phase induction motor
- 8) To Study construction of AC commutator motors.

Reference Books

1. Electrical Technology Vol. II Author BL Thereja, Khanna publisher
2. Electrical Machines by Bhattacharya, T.T.T.I.
3. Electrical Machines by Nagrath & Kothari, PHI
4. Electrical Machines Vol. I & II by PS Bhimbra, Khanna publishers

Course outcomes-

CO1. Analyze and design three-phase induction motors, including performance calculations and efficiency optimization.

CO2. Understand and apply synchronous machine theory, including equivalent circuits and performance analysis.

CO3. Design and develop control strategies for electric machines, including scalar control and vector control.

CO4. Analyze and design synchronous machines, including performance calculations and efficiency optimization.

CO5. Analyze and design AC commutator machines, including performance calculations and efficiency optimization.



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DEE 042

Electronic Devices

Course Objectives - This course aims to provide a comprehensive understanding of semiconductor material properties, diode circuits, bipolar junction transistors (BJT), small signal analysis, and field-effect transistors (FET). Students will learn about the characteristics and applications of various semiconductor devices, including special diodes and photo detectors. The course covers ideal and practical diode circuits, power supplies, BJT operation and configurations, analyses, and different types of power amplifiers. Additionally, students will gain insights into the construction and operation of JFETs and their applications in modern electronics.

Unit - I

Semiconductor Material Properties -Elemental & compound semiconductor materials, Bonding forces and Energy bands in intrinsic and extrinsic silicon, Charge carrier in semiconductors, carrier concentration, Junction properties, Equilibrium condition, biased junction, Steady state condition, breakdown mechanism (Rectifying Diodes, Zener Diodes), Metal Semiconductor Junction. Special diodes: Tunnel diodes, Varactor diodes, Schottky diode, Photodetector, LED, solar cell

Unit-II

Diode circuits -Ideal and Practical diode, Clipper, Clamper. Power Supply: Rectifiers-Half wave, Full wave, Bridge rectifier, filter circuits, Voltage regulation using shunt & series regulator circuits, Voltage regulation using IC.

Unit-IV.

Fundamentals of BJT - Construction, basic operation, current components and equations, CE and CC configuration, input and output characteristics, Region of operations: active, cut-off and saturation region. BJT as an amplifier, Transistor biasing circuits and analysis: Introduction, Transistor as a switch.

Unit-4

Small Signal analysis -Small signal Amplifier, Amplifier Bandwidth, Hybrid model, analysis of transistor amplifier using h-parameter, Multistage Amplifier: Cascading amplifier, Boot-strapping Technique, Darlington amplifier and case-code amplifier, Power Amplifiers: Class A, Class B, Class AB, Class C, Class D, Transformer coupled and Push-Pull amplifier.

Unit-5.

FET construction-JFET: Construction, n-channel and p-channel, transfer and drain characteristics, parameters, Equivalent model and voltage gain, analysis of FET in CG, CS and CD configuration. Enhancement and Depletion MOSFET drain and transfer Characteristics. Unit- junction Transistor (UJT) and Thyristors: UJT: Principle of operation, characteristics, UJT relaxation oscillator.



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DEE042P ELECTRONIC DEVICES LAB

List of Experiments

- 1) To Study of CRO applications.
- 2) To Study V-I characteristics of silicon & Germanium PN Junction diodes.
- 3) To Study of V-I CHARACTERISTICS OF ZENER Diode.
- 4) To study characteristics of BJT in CE configuration.
- 5) To Study characteristics of JFET in Common Source Configuration.
- 6) To Study Half wave and Full Wave Rectifier without filter.
- 7) To Study Half wave and Full Wave Rectifier with filter.
- 8) To study characteristics of Common Emitter BJT amplifier.
- 9) To study Hartley and Colpitts Oscillator.
- 10) To study of Applications of Operational Amplifier.

Text/Reference Books:

1. Millman Halkias, "ElectronicDevicesAndCircuits," MH.
2. Saliva Hanan, Kumar & Vallavaraj, "ElectronicDevicesAndCircuits," TMH.
3. Boylestad Neshelsky, "ElectronicDevicesAndCircuits," PHI.
4. Schilling & Belove, "Electronic Circuits, Discrete Integrated," MH.
5. Chattopadhyay & Rakshit, "Electronic Fundamentals & Applications," New Age
6. AdelS. Sedra & Kenneth C. Smith, "Microelectronic Circuits," UP.
7. R.A. Gayakwad, "Op-Amps And Linear Integrated Circuits", PHI
8. Theodore F. Bogart, Jeffrey's. Beasley, "Guillermo Rico Electronic Devices Circuits."
9. Allen Mottershead, "Electronic Devices & Circuits."



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Course outcomes -

CO1. Understand the fundamental principles of electronic devices, including diodes, transistors, and thyristors.

CO2. Analyze and design electronic circuits using various devices, including amplifiers, switches, and rectifiers.

CO3. Understand and apply device modeling techniques, including equivalent circuits and Spice simulation.

CO4. Evaluate device performance metrics, including gain, frequency response, and efficiency.

CO5. Develop and implement testing and measurement techniques for electronic devices



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DEE 043

ELECTRICAL ENGG. DRAWING

Course Objectives - This course aims to provide comprehensive knowledge in electrical symbols and notations, domestic wiring, instrument circuits, winding diagrams, electrical machine drawing, and power wiring. Students will learn to understand and interpret various symbols and notations for practical units and accessories, wiring of residential buildings, and connections of different meters in circuits. They will gain skills in creating and reading winding diagrams for D.C. machines and three-phase motors and draw detailed parts of electrical machines. The course also covers internal wiring diagrams of motors and starters, equipping students with the expertise needed for practical applications in electrical engineering.

Unit I

Symbols and Notations - Symbols of practical units, multiples and submultiples, types of supplies, single phase, three phase three wire, three phase four wire, D.C. supply etc. Accessories like main switches, distribution boards, fans, light fixtures, bell, buzzer, lighting arrest. All types of motor starters, instruments, electronic components etc. Rating plate of machines.

Unit II

Domestic Wiring -All types of light circuits: Fluorescent tube circuits, intermediate switch circuits, fan circuits. Wiring of a residential building. Sodium vapor lamp, mercury vapor lamp.

Unit III

Instrument Circuits - Connection of meters in circuits. Ammeter, voltmeter, wattmeter, energy meter, Power factor meter, frequency meter, synchroscope etc. Extension of range using shunt, multiplier, current transformer, potential transformers etc.

Unit IV

Winding Diagrams - Simplex type lap and wave diagrams for D. C. Machines. Single phase and three phase motor winding diagrams.

Unit V

Electrical Machine Drawing - Parts of D.C. machines like, magnetic poles, commutator, armature etc. Acaciins rotor, slip rings, etc. Various cable sections. Bushing of the transformer. Assembly diagrams of D.C. machine, A.C. machine, and transformer.

Unit VI

Power Wiring -Internal wiring diagrams of single-phase motor. wiring diagrams of D.C. and A.C. motor starters like three-point shunt motor starters, four-point compound motor starters, direct online (D.O.L.) starter, star- delta starter, contactor type and autotransformer starter. Internal connections of D.C. series, shunt machines.



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Reference Books

- (1) A textbook of Electrical Drawing .by S.L. Uppal (Khanna pub.)
- (2) Electrical Drawing by K.L. Narang.
- (3) Electrical Drawing by C.R. bargain

Course outcomes- The student will be able to-

CO1. Understand and apply electrical drawing standards and conventions (e.g., IEEE, IEC).

Understand and apply electrical symbol recognition and interpretation.

CO2. Create and interpret electrical schematics, including circuit diagrams and wiring diagrams.

CO3. Design and develop electrical drawings for various applications (e.g., power systems, control systems).

CO4. Analyze and troubleshoot electrical circuits using drawings and diagrams.

CO5. Develop and maintain electrical drawing documentation and records.



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DEE 044

GENERATION, TRANSMISSION & DISTRIBUTION

Course Objectives - This course aims to provide a comprehensive understanding of both non-conventional and conventional energy sources, including their principles, applications, and the advantages and disadvantages of various power plants. Students will learn about load concepts, types of loads, and various factors affecting load management. The course covers different tariff types, their merits and demerits, and practical problems related to tariffs. Additionally, students will gain insights into transmission systems, including A.C. and H.V.D.C. transmission, along with the impact of external factors like wind and temperature on transmission lines, preparing them for advanced studies and practical applications in power systems engineering.

Unit I.

Non-Conventional Sources of Energy - Concept and need of primary and secondary energy sources, difference between conventional and non-conventional sources of energy, concept of solar, wind, biogas, ocean, tidal, geothermal, fuel cell, MHD and their practical applications.

Unit II.

Conventional Sources of Energy - Detailed study of generating stations - thermal, hydro, nuclear, schematic diagram, site selection main components and auxiliaries for above power stations. Study of gas turbines plant and diesel power plant. Advantages, disadvantages of thermal, hydro, nuclear, gas turbine plant and diesel power plant.

Unit III.

Concept Of Load - Types of loads, load curve, load duration curve, connected load, demand factor, average load, maximum demand, load factor, diversity factor, plant utilization factor, capacity factor, reserve capacity. Simple numerical on the above terms.

Unit IV.

Types of Tariffs, flat rate, block rate, two-part, maximum demand, and power factor tariff. Their merits and demerits. Simple problems on the above terms.

UNIT V.

Concept of Transmission, single line diagram of complete power system, standard voltages of A.C. Transmission, efficiency (no derivation). H.V.D.C. transmission system, line diagram, advantages, and Disadvantages of H.V.D.C.

Sag, causes & effects of sag on transmission line, effect of wind, ice, and temperature on sag. Types of line supports, type of joints, lumps, earth wires, ground wires and vibration dampers.



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DEE 044P.

GENERATION, TRANSMISSION & DISTRIBUTION

LIST OF EXPERIMENT

- 1) To study various types of distribution schemes in power systems.
- 2) To study various types of conductors used in transmission line.
- 3) To study various types of insulators used in transmission line.
- 4) To study electricity production through thermal power plants.
- 5) To study electricity production through nuclear power plants.
- 6) To study electricity production through Hydro power plant.
- 7) To study electricity production through Solar PV cells.
- 8) To study electricity production through wind turbine.

REFERENCE BOOK

Non-Conventional energy sources By G.D. Rai, Khanna publisher

Electrical Power By S.L. Uppal, Khanna publisher

Electrical Power by J.B. Gupta

Power System by V.K. Mehta

Course outcomes- The student will be able to-

CO1. Understand the fundamental principles of electrical power generation, transmission, and distribution.

CO2. Analyze and design electrical power systems, including generator selection, transmission line design, and distribution network configuration.

CO3. Understand and apply transmission and distribution system protection schemes.

CO4. Develop strategies for optimizing power system performance, reliability, and efficiency.

CO5. Evaluate the economic and environmental impacts of different power generation sources (e.g., fossil fuels, renewables).



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DEE045 ENTREPRENEURSHIP

Course Objectives - This course aims to equip students with a comprehensive understanding of entrepreneurship, including the definitions, characteristics, and classifications of entrepreneurs, and the reasons for entrepreneurial failures. It covers the importance of industries and business organizations in national development, with a focus on government policies for SSI promotion. The course provides insights into various forms of institutional assistance, ranging from financial to marketing support, and guidance on planning and implementing an industrial unit. Additionally, students will explore incentives, subsidies, and facilities available for entrepreneurs, along with achievement motivation and financial management tools essential for managing an SSI. This holistic approach ensures students are well-prepared to embark on and manage successful entrepreneurial ventures.

Unit.

INTRODUCTION TO ENTERPRENEURSHIP - Definition of Entrepreneur /Entrepreneur, Difference between Entrepreneurship / Entrepreneurship, Need for Entrepreneurship, qualities of successful entrepreneur, Myths about Entrepreneurship, Classification of entrepreneurs on the basis of different criteria, Reasons for the failure of entrepreneurs.

Unit II

INDUSTRIES AND BUSINESS ORGANIZATIONS - Concept of Industry or Enterprise, Classification of Industries Its significance in National Development, Govt. policies for SSI promotions, Sector / Product for SSI.

Unit III

INSTITUTIONAL ASSISTANCE - Types of Institutional assistance (Infra ,structural assistance, Technical Assistance, Financial assistance, Marketing Assistance), Information / guidance & Training- SISI,ASK,MPCON, CSIR, CED, MA, NRDC, Infrastructure-D/C,AVN/AKVN, Finance SIDBI, KVIB, MPFC, NABARD, MPWDC, NSIC, M.P.A.V.V.N. , Marketing- MP, AGRO, NSIC, PM.LUN, EXPORT COPPORATION,KVIP,MPHSVN,MPLDC, Quality Control - BIS, FPO, MPLUN, F.D.A.,AG. MKT. Board.

Unit IV

INCENTIVES / CONCESSION / FACITLITIES AVAILABLE Seed money, Incentive / subsidies, Others (Phones, Lands etc.)**PLANNING OF AN INDUSTRIAL UNIT (SSI)**Pre- Planning Stage, Scanning the environment, Market survey, Seeking information, product / project selection Implementation Stage, PPR Preparation, DIC registration, Arrangement of Land, Arrangement of Power, Obtaining NOC / Licenses from various departments, DPR Preparation, Seeking financial assistance, Commercial Production Post Implementation stage, Permanent registration from D.I.C., Availing Subsidies, Diversification / Modification, Setting up of marketing channel / Distribution.

Unit V

ACHIVEMENT MOTIVATION, Historical perspective, Concept of achievement motivation, Significance of achievement motivation, Development of achievement motivation Financial



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MANAGEMENT OF AN INDUSTRIAL UNIT (SSI), Tools of financial analysis, Ratio analysis, Fund Flow / Cash flow analysis, Working capital and concepts, financial accounting.

PROJECT WORK/ASSIGNMENT

1. Preparing a chart to show various factors affecting entrepreneurship
2. To collect details related to various schemes run by the Govt. for Self-Employment and Entrepreneurship.
3. To identify and select a project and conduct Market-Survey thereof.
4. To collect various formats used in industries & departments/institutions working in the field of entrepreneurship.
5. Visit few small-scale industries situated in city, nearby industrial area.
6. Discuss the problems related to SSI (Small Scale Industries) with an entrepreneur.
7. Collect information about market rates, quality, and quantity of goods for their choice.
8. Develop logical and analytical approach to purchase raw material / finished goods.
9. To prepare for a case study of successful entrepreneurs.
10. Preparation of Project report for the industry/ Business they are willing to start.

Reference Books: -

1. Entrepreneurial Development Vol. I, II, III By Vacant decay Himalaya Publication
2. CEDMAP (Center of Entrepreneurial development Madhya Pradesh)
3. Udyamita, Visby An and Prakashan.

Course outcomes-

CO1. Identify and develop innovative business ideas in engineering.

CO2. Conduct market research and analyze industry trends in engineering.

CO3. Create a business plan and pitch for an electrical engineering startup. Secure funding and resources for a startup

CO4. Understand and apply principles of entrepreneurship, including risk management and adaptability.

CO5. Develop leadership and teamwork skills in an organization



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DEE045

PRINCIPLES AND PRACTICES OF MANAGEMENT

Course Objectives - This course aims to provide a comprehensive understanding of the evolution and concepts of marketing, the various internal and external factors that make up the marketing environment, and the planning and organization needed for effective marketing. Students will learn about market segmentation and targeting, as well as the elements of the marketing mix (product, place, price, promotion) and how they interplay. They will also study product management, including new product development and the product life cycle, place and distribution management, and various pricing and promotion strategies. This holistic approach prepares students to effectively analyze, plan, and execute marketing strategies in a competitive environment.

Unit I

Evolution of marketing-a historical background The stage of barter, The stage of money economy, The stage of industrial revolution, The stage of competition, The emergence of marketing, Selected definitions of marketing, Different concept of marketing, The exchange concept, The production concept, The product concept, The sales concept, The marketing concept, Difference between selling & marketing, Benefits & significance of marketing, Helps to remove causes for under development, Improve productivity & efficiency, Canalize country's economic resources properly, Insure better deal for consumer, Make economic planning meaningful & relevant etc.

Unit II

Marketing environment Internal & external factors, Demographic environment, Economic environment, Political environment, Physical environment, Technological environment, Competitive environment, Social & cultural environment, Micro & macro environment

Unit III

Marketing planning & organization Scope & importance of planning, Steps in marketing planning process, Purpose & principle of organization, Models of marketing organization, Line & staff type, Product based organization, Territory oriented organization, Complex organization, Task of chief marketing executive, Decentralization

Unit IV

Market segmentation Types of market, Definitions & benefits of segmentation, Methods of segmentation, Geographic segmentation, Demographic segmentation, Psychographic segmentation, Buyer behavior Segmentation, Volume segmentation, Steps in market segmentation, Market targeting



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Unit V

Market mix

Definition of market mix, Elements of marketing mix (4 P'S) -Product, Place, Price, Promotion, Environmental variable (uncontrollable variables), Customer variable, Competition variable, Trade variable, Environmental variable, Product management, Components of product, Types of product, The product line & product mix, New product development (NPD) Significance & classification of new product, Stages in NPD, Estimating the demand for new product, Test marketing Product life cycle (PLC), Concepts & benefits of PLC, Different stages in PLC, Strategies used in different stages Place management, Physical distribution, The distribution channel, Price management, The meaning & importance of pricing, Objectives of pricing, Factors affecting pricing –Internal & external, Pricing methods, Pricing policies & setting the price Promotion management, Sales promotion, Advertising, Difference between sales promotion & advertising

Reference Books: -

1. Marketing management - Analysis, Planning & Control - Philip Kilter
2. Principles & practice of Marketing in India - C.B. Memoria & R.L. Joshi
3. Contemporary Marketing – Louis & Bone & David L. Kurtz
4. Essential of Management –Koontz

Course Outcomes -

CO1. Understand the fundamental concepts of marketing, including segmentation, targeting, and positioning (STP).

CO2. Analyze market research data to inform marketing decisions. Create and execute a marketing plan.

CO3. Develop effective marketing strategies and tactics. Apply digital marketing tools and techniques (social media, email, SEO, etc.).

CO4. Understand consumer behavior and decision-making processes.

CO5. Identify and evaluate marketing channels (digital, traditional, etc.)