

SEMESTER FOURTH

DEE401

ELECTRICAL MACHINES – I

L3:T0:P0

RATIONALE

Electrical machines is a subject where a student will deal with various types of electrical machines which are employed in industries, power stations, domestic and commercial appliances etc. After studying this subject, an electrical diploma holder must be competent to repair and maintain these machines and give suggestions to improve their performance. Practical aspects of the subject will make the students capable of performing various tests on the machines as per latest BIS specifications

DETAILED CONTENTS

Unit-1

DC Generators: Main constructional features of DC machines, working principle, Types of armature winding, Function of the commutator for generation action , Factors determining induced emf ,Types of dc generation on the basis of excitation, voltage built up in a dc shunt generator, Armature Reaction , Commutation methods to improve commutation .

Unit-2

DC Motors: Performance and characteristics of different types of DC motors Function of the commutator for motoring action, Significance of back emf., the relation between back emf and Terminal voltage, Speed control of dc shunt/series motors , Need of starter, three point dc shunt motor starter and 2 point starter, Applications of DC motors, Losses in a DC machine, Determination of losses by Swinburne's test

Unit-3

Single Phase Transformers: Introduction , Constructional features of a transformer and parts of transformer , Working principle of a transformer, EMF equation, Transformer on no-load and its phasor diagram ,Transformer – neglecting voltage drop in the windings – Ampere turn balance – its phasor diagram ,Mutual and leakage fluxes, leakage reactances, Transformer on load, voltage drops and its phasor diagram , Equivalent circuit, Relation between induced emf and terminal voltage, regulation of a transformer- mathematical relation, Losses in a transformer

Unit-4

Transformers Tests: Open circuit and short circuit test. Calculation of efficiency, condition for maximum efficiency-maintenance of Transformer, scheduled Maintenance, Auto-transformer construction, saving of copper, working and applications, Different types of transformers including dry type transformer.

Unit -5

3-Phase Transformers: Construction of three phase transformers and accessories of transformers such as Conservator, breather, Buchholz Relay, Tap Changer (off load and on load) (Brief idea), Types of three phase transformer i.e. delta-delta, delta-star, star Delta and star-star, Conditions for parallel operation (only conditions are to be studied), On load tap changer, Difference between power and distribution transformer, Cooling of transformer

LIST OF PRACTICALS

1. Measurement of the angular displacement of the rotor of a slip-ring induction motor on application of DC to stator of motor winding in sequence and simultaneously to each phase of rotor winding
2. Speed control of dc shunt motor (i) Armature control method (ii) Field control method
3. Study of dc series motor with starter (to operate the motor on no load for a moment)
4. Study of 3 point starter for starting D.C. shunt motor.
5. To perform open circuit and short circuit test for determining: (i) equivalent circuit (ii) the regulation and (iii) efficiency of a transformer from the data obtained from open circuit and short circuit test at full load
6. To find the efficiency and regulation of single phase transformer by actually loading it.
7. Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations
8. Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as
 - (a) Star-star
 - (b) Star delta
 - (c) Delta star

INSTRUCTIONAL STRATEGY

Electrical machines being a core subject of electrical diploma curriculum, where a student will deal with various types of electrical machines which are employed in industry, power stations, domestic and commercial appliances etc. After studying this subject, an electrical diploma holder must be competent to repair and maintain these machines and give suggestions to improve their performance. Special care has to be taken on conceptual understanding of concepts and principles in the subject. For this purpose exposure to industry, work places, and utilization of various types of electrical machine for different applications may be emphasized. Explanation of practical aspects of the subject will make the students capable of performing various tests on the machines as per latest BIS specifications.

RECOMMENDED BOOKS

1. Electrical Machines by SK Bhattacharya, Tata Mc Graw Hill, Education Pvt Ltd. New Delhi
2. Electrical Machines by SK Sahdev, Uneek Publications, Jalandhar
3. Electrical Machines by Nagrath and Kothari, Tata Mc Graw Hill, New Delhi
4. Electrical Machines by JB Gupta, SK Kataria and Sons, New Delhi
5. Electrical Machines by Fitzgerald
6. Electrical Machines by Smarajit Ghosh-Pearson Publishers, Delhi.

RATIONALE

In the present industrial scenario, it is desired that diploma engineers be able to identify, classify, troubleshoot and maintain the different Control Systems. They are required to implement the planned plant Control Systems. Therefore, this course has been designed so that students may learn to build, test and wire the different types of Control Systems for Process Application

DETAILED CONTENTS**Unit-1**

Basics of Control System: Introduction, Definitions. Classification of Control Systems with examples.

Open loop systems: Sprinkler used to water a lawn, Stepper motor positioning and Automatic toaster systems.

Closed loop systems: Human being, Home heating Systems, Voltage Stabilizer.

Comparison of open loop and closed loop control systems.

Unit-2

Transfer function and impulse response: Definition, Advantages and disadvantages of transfer function, Procedures to determine the transfer function of a control system, Impulse Response, Poles and zeros of transfer Function, Characteristics equation of transfer function

Unit-3

Block Diagram Representation: Introduction to Block Diagram representation, Advantages and disadvantages of Block Diagram, Simple or canonical Form of Closed Loop System, Rules for Block Diagram Reduction (simple), Procedure to solve block diagram reduction problems

Unit-4

Signal flow graph representation: Introduction of Signal Flow Graph, Properties of Signal Flow Graph, Terminology used in Signal Flow Graph, Methods to obtain Signal Flow Graph from system equations & Block Diagram, Masons Gain Formula, Comparison of Block Diagram and Signal Flow Graph

Unit-5

Time response analysis of control system and stability: Definition of type and Order of System

Standard test inputs, Steady State Analysis, Steady-state errors and error constants, Derivation of Steady State Error, Time Response of first order system to step input, Time Response of second order system to step input, Time Response specifications of the second order system,.

Concept of Stability, Routh-Hurwitz Criteria for Stability.

LIST OF PRACTICALS

- 1 Identify various blocks of a given open loop system.
- 2 Identify various blocks of a given closed loop system
- 3 Convert an open loop system in to a closed loop and observe the difference in output using control simulator.
- 4 To study the torque-speed characteristics of an AC servo motor, Determine its parameters and evaluate its transfer function.
- 5 To study the open loop and closed loop step response of first and second order simulated linear systems.

INSTRUCTIONAL STRATEGY

Visit to Industries.

Use Free Simulators Software for teaching / learning activities.

Show Video/Animation Films relevant to Automation & Control System.

RECOMMENDED BOOKS

1. Control System Engg by I.J.Nagrath and M.Gopal , TMH
2. Control Systems: Principles and Design by M.Gopal, TMH
3. Control System Engg by Ogata, PHI
4. Automatic Control System by BC Kuo, Prentice Ha
5. Linear Control System by B.S.Manke, Khanna publication
6. Feed back Control Systems by Dr. S D. Bhide & Barapte, Tech max Publication.
7. Control Systems Engineering by S.K. Bhattacharya, Pearson Education.
8. Automatic Control system by Syed Hasan Saeed , S.K. Kataria & Sons.

RATIONALE

The purpose of the introduction of electronics in the electrical engineering diploma course has been already explained in the rationale of the subject Analog Electronics. In this course topic like Number System, Logic Gates, Combinational & Sequential Circuits, Power Supplies & Wave Shape Circuits have been dealt with.

DETAILED CONTENT**Unit-1**

Number Systems & Gates: Decimal, binary, octal, hexa-decimal BCD and ASCII code number systems and their inter-conversion, Binary and Hexadecimal addition, subtraction and multiplication, 1's and 2's complement methods of addition/subtraction Definition, symbol and truth tables for inverter, OR, AND, NAND, NOR and X-OR exclusive-AND gates

Unit-2

Boolean Algebra & Combinational Circuits : Boolean Relations and their applications ,DeMorgan's Theorems, K-Map up to four variables, Half adder, Full adder, Subtractor (half and full). Encoder, Decoder, Multiplexer/Demultiplexer, Display Devices (LED, LCD and 7-segment display)

Unit-3

Flip-Flops, Introduction of Shift Registers and Counters: J-K Flip-Flop, R-S Flip-Flop, D-Type Flip-Flop, T-Type Flip-Flop, Applications of Flip-Flop.

Unit-4

A/D and D/A Converters: A/D converter (Counter ramp, successive approximation method of A/D Conversion), D/A converters (Binary weighted, R-2R D/A Converter)

Unit-5

Power supplies: Working Principles of different types of power supplies viz. CVTs, IC voltage regulator (78 XX, 79XX)

LIST OF PRACTICALS

1. Verification and interpretation of truth table for AND, OR, NOT, NAND, NOR, X-OR gates
2. Construction of Half Adder/Full Adder using gates
3. Construction of Encoder & Decoder using Gates
4. To verify the truth table for R-S and JK flipflop
5. Construction and testing of any counter
6. Verification of operation of a 8-bit D/A Converter
7. To realize the regulated power supply by using three terminal voltage regulator ICs such as 7805, 7905, 7915 etc.

INSTRUCTIONAL STRATEGY

The teacher should bring electronic components and devices in the class while taking lectures and explain and make students familiar with them. Also he may give emphasis on practical applications of these devices and components in the field. In addition, the students should be encouraged to do practical work independently and confidently.

RECOMMENDED BOOKS

1. Modern Digital Electronics by RP Jain, Tata McGraw Hill, Education Pvt. Ltd. New Delhi
2. Digital Principles and Electronics by Malvino and Leach, Tata McGraw Hill, New Delhi
3. Digital Electronics by SN Ali
4. Digital Electronics by Rajive Sapra, Eshan Publications, Ambala City
5. Digital Fundamentals by Floyd and Jain, Pearsons Education (Singapore) Pte Ltd Patparganj, Delhi 110092
6. Digital Electronics by Jamwal, Dhanpat Rai and Co. New Delhi
7. Digital Systems by Sanjay K Bose, Wiley Eastern(P) Ltd. New Delhi
8. Digital Systems : principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi

DEE404 ESTIMATING AND COSTING IN ELECTRICAL ENGINEERING L3:T0:P0

RATIONALE

A diploma holder in electrical engineering should be familiar to Indian Standards and relevant Electricity Rules. Preparation of good estimates is a professional's job, which requires knowledge of materials and methods to deal with economics. The contents of this subject have been designed keeping in view developing requisite knowledge and skills of estimation and costing in students of diploma in electrical engineering.

DETAILED CONTENTS

Unit-1

Introduction: Purpose of estimating and costing, Performa for making estimates, preparation of materials schedule, costing, price list, preparation of tender document (with 2-3 exercises), net price list, market survey, overhead charges, labour charges, electrical point method and fixed percentage method, contingency, profit, purchase system, enquiries, comparative statements, orders for supply, payment of bills. Tenders – its constituents, finalization, specimen tender.

Unit-2

Types of wiring: Cleat, batten, casing capping and conduit wiring, comparison of different wiring systems, selection and design of wiring schemes for particular situation (domestic and Industrial). Selection of wires and cables, wiring accessories and use of protective devices i.e. MCB, ELCB etc. Use of wire-gauge and tables (to be prepared/arranged)

Unit-3

Estimating and Costing: Domestic installations; standard practice as per IS and IE rules. Planning of circuits, sub-circuits and position of different accessories, electrical layout, preparing estimates including cost as per schedule rate pattern and actual market rate (for house of two room set along with layout sketch) , Industrial installations; relevant IE rules and IS standard practices, planning, designing and estimation of installation for single phase motors of different ratings, electrical circuit diagram, starters, preparation of list of materials, estimating and costing exercises on workshop with single-phase, 3-phase motor load and the light load (3-phase supply system) ,Service line connections estimate for domestic up to 10 KW and Industrial loads up to 20 KW (over-head and underground connections) from pole to energy meter.

Unit-4

Estimating the material required for transmission & distribution lines: Transmission and distribution lines (overhead and underground) planning and designing of lines with different fixtures, earthing etc. based on unit cost calculations

Unit-5

Estimating the material required for Substation: Types of substations, substation schemes and components, estimate of 11/0.4 KV pole mounted substation up to 200 KVA rating, methods of earthing of substations, Key Diagram of 66 KV/11KV and 11 KV/0.4 KV Substation ,Single line diagram, layout sketching of outdoor, indoor 11kV sub-station or 33kV substation

INSTRUCTIONAL STRATEGY

Teacher should identify/prepare more exercises on the pattern shown above. The teacher should make the students confident in making drawing and layouts of electrical wiring installations and doing estimation and costing leading to preparation of small tender document.. This capability will lead the students to become a successful entrepreneur. Take the students to field/laboratory and show the material and equipment.

RECOMMENDED BOOKS

1. Electrical Installation, Estimating and Costing by JB Gupta, SK Kataria and Sons, New Delhi
2. Estimating and Costing by SK Bhattacharya, Tata McGraw Hill, New Delhi
3. Estimating and Costing by Surjeet Singh, Dhanpat Rai & Co., New Delhi
4. Estimating and Costing by Qurashi
5. Estimating and Costing by SL Uppal, Khanna Publishers, New Delhi
6. Electrical Estimating and Costing by N Alagappan and B Ekambaram, TMH, New Delhi

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DETAILED CONTENTS

Note: Since this is a practical type subject, there will be no theory examination. List of practicals are listed below:

LIST OF PRACTICALS

1. Introduction to Simulation and Matlab Programming.
2. Simulation of diode characteristics
3. Simulation of Zener Diode Characteristics
4. Simulation of half wave rectifier
5. Simulation of full wave Rectifier.
6. Simulation of Transistor Characteristics

RATIONALE

An electrical diploma holder will be required to inspect, test and modify the work done by skilled workers or artisans working under him. In addition to these persons, many a times, it will become necessary for him to demonstrate the correct method and procedure of doing a job. In order to carry out this function effectively in addition to conceptual understanding of the method or procedure he must possess appropriate manual skills. The subject aims at developing special skills required for repairing, faultfinding, wiring in electrical appliances and installations.

DETAILED CONTENTS

1. To carry out pipe/plate earthing for a small house and 3-phase induction motor. Testing the earthing using earth tester
2. Connections of single phase and 3-phase motors, through an appropriate starter and to change their direction of rotation
3. Wiring, testing and fault finding of the following contactor control circuits operating on 3-phase supply:
 - a) Remote control circuits
 - b) Time delay circuits
 - c) Inter locking circuits
 - d) Sequential operation control circuitsNote: Students may be asked to study control circuit of a passenger lift, automatic milling machine, etc. using relays
4. Winding/re-winding of a fan (ceiling and table) and choke
5. Power cable jointing using epoxy based jointing kits
6. Demonstration of laying of underground cables at worksite
7. Dismantling/assembly of star-delta and DOL starter
8. Dismantling and assembly of voltage stabilizers
9. Repair and maintenance of domestic electric appliances such as electric iron, geyser, fan, heat convector, desert cooler, room heater, electric kettle, electric oven, electric furnace etc.
10. Dismantling/assembly/maintenance of motor operated appliances such as mixer, blender, drill machine etc.

ENTREPRENEURIAL AWARENESS CAMP

This is to be organized at a stretch for two to three days during or at the end of 4th semester. Lectures will be delivered on the following broad topics. There will be no examination for this subject.

1. Who is an entrepreneur?
2. Need for entrepreneurship, entrepreneurial career and wage employment
3. Scenario of development of small scale industries in India
4. Entrepreneurial history in India, Indian values and entrepreneurship
5. Assistance from District Industries Centres, Commercial Banks, State Financial Corporations, Small industries Service Institutes, Research and Development Laboratories and other financial and development corporations
6. Considerations for product selection
7. Opportunities for business, service and industrial ventures
8. Learning from Indian experiences in entrepreneurship (Interaction with successful entrepreneurs)
9. Legal aspects of small business
10. Managerial aspects of small business

ELECTIVE-I (GENERIC)

RATIONALE

Entrepreneurship development aim at developing conceptual understanding for setting-up one's own business venture/enterprise. This aspect of Human Resource Development has become equally important in the era, when wage employment prospects have become meager.

DETAILED CONTENTS**UNIT-1**

Entrepreneurship: concept, characteristics, and prerequisites, classification of entrepreneurship, Entrepreneurial Skills, Factors influencing entrepreneurship, Role of entrepreneurship in economic development, Challenges in starting a new venture.

UNIT-2

The entrepreneurial process, Developing ideas and business opportunities- methods of generating new idea, New Product development- stages, writing and presentation of the business plan, Market analysis and Feasibility Planning.

UNIT-3

Financing the venture & other support systems- Early stage finances and growth funding, Commercial banks- types of bank loans; District Industry centres (DICs), State Financial Corporations. Small Industries Development Bank of India, National Bank of Agriculture and Rural development (NABARD). How to start a small scale industry (SSI), Procedures for registration of SSI.

UNIT-4

Patents, Trademarks and Copyrights- concept and its application in the market, Intellectual property infringement; mergers and acquisition; corporate social responsibility.

UNIT-5

Going public: Advantages and Disadvantages. Harvesting the venture and other strategies, Buyout Agreement Negotiation and Time Management.

RECOMMENDED BOOKS

1. Agarwal, Vinod K, Initiative enterprise and economic choice in a study of the paters of entrepreneurship. Munshiram Manoharlal, New Delhi.
2. Clifton, Davis S and F Y fir, David E, project feasibility analysis, John Willey, New York.
3. David H Holt, Entrepreneurjrship: New Venture creation, Prentice Hall.
4. Deasi vasant, Entrepreneurial Development, Himalayas publishing house.
5. Druker peter, Innovation and Entrepreneurship, Heinemann London.
6. Kumar S.A, Entgrepreneurship in small industry, Discovery Publishers New Delhi.

RATIONALE

The diploma holders are generally expected to take up middle level managerial positions, their exposure to basic management principles is very essential. Various Topics have been included in the subject to provide elementary knowledge about these management areas

DETAILED CONTENTS**UNIT 1.**

Introduction: Management, nature, process and significance of Management; Managerial skills; Managerial Roles; Overview of functional areas of management-Marketing, Finance, Production, HRM, IT, Development of managerial Thought. Taylor concept, Henry Fayol, Elton Mayo concept. Contingency approach overview.

UNIT 2.

Planning: Concept, Process and Types; concept of Decision making; Decision making process; Factors affecting decision making process; Management by objectives (MBO) & Management by Exception (MBE). Planning-analysis and diagnosis, Strategy formulation.

UNIT 3

Organising: Concept, nature, process and Significance; Authority and responsibility relationship-Delegation, Centralisation & Decentralisation; formal and informal organisation structures. Hierarchy and flat structures.

UNIT 4

Directing and leading, Concept, Nature, Scope and principles of Direction, Manager versus leaders; Leadership Theories – Trait Theories, Concept of motivation and how to motivate employees in organisation.

UNIT 5

Controlling; Meaning and process of control, Types of control , steps in control process. Control tools and techniques- informational controls and financial controls.

RECOMMENDED BOOKS

1. L.M.Prasad. Principal and Practice of Management.
2. George R. Teery and Stephan G. Franklin. Principles of Management. AITBS Publications.
3. Knootz, Harold and Weihrich. Esserntials of Management. TMH Publications.
4. Burton and Thakur. Management Today (Principles and practices). TMH Publications.
5. Stones, Freeman, Gilbreth, Management. PHI Publications 6th Edition.

RATIONALE

Arabic is becoming a popular language to learn in the Western world, even though Arabic grammar is sometimes very hard to learn for native speakers of Indo-European languages. Many other languages have borrowed words from Arabic, because of its importance in history. This includes support from beginning to study abroad programs, intensive instruction opportunities, teacher exchanges, employment and professional development.

DETAILED CONTENTS**UNIT 1**

Lesson no. 1 to 6

UNIT 2

Lesson no. 7 to 13

UNIT 3

Lesson no. 14 to 18

UNIT 4

Lesson no. 19 to 23

UNIT 5

Al - Quran (from Surah Al-feel to Surah Al-Naas) with translation and brief commentary.

RECOMMENDED BOOKS

Duroos-ul-Lughat-il-Arabiyyah li Ghayr-in-Naatiqeena bihaa Part-I by Dr. V Abdul Rahim; Published by:
Islamic Foundation Trust 78, Perambur High Road Chennai -600012

DETAILED CONTENTS**UNIT 1**

Introduction: Introduction to operation Research, Linear Programming problem, Formulation of LPP, Graphical solution of LPP, simplex method, artificial variables, big-M method.

UNIT 2

Transportation Problems: Formulation, solution of balanced transportation problem. Finding initial basic feasible solutions à €. North-west corner rule, least cost method and Vogoles approximation method.

UNIT 3

Assignment Model and Hungarian method: Assignment Model Formulation, Hungarian method for optimal solution; solving unbalanced problems; travelling salesman problem and assignment.

UNIT 4

Sequencing Models: Solution of sequencing problem à €; processing n jobs through two machines, à € processing n jobs through three machines à €; Processing two jobs through m machines.

UNIT 5

Dynamic Programming: Introduction to Dynamic programming problems, Characteristics and applications of Dynamic Programming, Mathematical formulation and optimal Solution of Dynamic Programming problems.

RECOMMENDED BOOKS

1. P. SankaraIyer, à € Operations Research, Tata McGraw Hill 2008
2. A.M. Natarajan, P.Balasubramani, A. Tamilarasi, à € Operations, Pearson Education, 2005.

