

ELECTRICAL MACHINES LABORATORY - II

| IV Semester: EEE | | | | | | | | |
|--|---|------------------------------|---|---|--------------------------|---------------|-----|-------|
| Course Code | Category | Hours / Week | | | Credits | Maximum Marks | | |
| AEEB17 | Core | L | T | P | C | CIA | SEE | Total |
| | | - | - | 3 | 1.5 | 30 | 70 | 100 |
| Contact Classes: Nil | Tutorial Classes: Nil | Practical Classes: 36 | | | Total Classes: 36 | | | |
| I. COURSE OVERVIEW: | | | | | | | | |
| <p>This course is intended to train the students on alternating current machines. It provides hands-on experience by conducting various direct and indirect tests on transformers, synchronous and asynchronous machines to analyse the characteristics of AC machines and separate various losses. This course also enables to develop skills to select, install, operate, and maintain various types of AC machines and transformers</p> | | | | | | | | |
| II. OBJECTIVES: | | | | | | | | |
| The course should enable the students to: | | | | | | | | |
| <p>I The elementary experimental and modelling skills for handling problems with electrical machines in industries and domestic applications.</p> <p>II The operation of AC machines and its role in power transmission and generating stations.</p> <p>III The automation concepts through programmable logic controllers to control the speed and starting current.</p> | | | | | | | | |
| III. COURSE OUTCOMES: | | | | | | | | |
| After successful completion of the course, students should be able to: | | | | | | | | |
| CO 1 | Select suitable testing strategies for evaluating the performance characteristics of transformers. | Apply | | | | | | |
| CO 2 | Determine the performance parameters of induction motor by conducting direct and indirect tests. | Evaluate | | | | | | |
| CO 3 | Explain the parallel operation of alternators for load sharing under various loading conditions. | Evaluate | | | | | | |
| CO 4 | Distinguish the synchronous impedance and ampere turns methods for the computation of voltage regulation of an alternator. | Analyze | | | | | | |
| CO 5 | Estimate the voltage and current swings in salient pole alternator for determination of direct and quadrature axis reactance. | Evaluate | | | | | | |
| CO 6 | Apply programmable logic controllers for limiting the starting current of poly phase induction motors. | Apply | | | | | | |
| IV. SYLLABUS: | | | | | | | | |
| LIST OF EXPERIMENTS | | | | | | | | |
| Expt. 1 | OC AND SC TEST ON SINGLE PHASE TRANSFORMER | | | | | | | |
| Determine the equivalent circuit parameters; predetermine the efficiency and regulation by open circuit and short circuit test on a single phase transformer. | | | | | | | | |
| Expt. 2 | SUMPNER'S TEST | | | | | | | |
| Predetermine the efficiency and regulation of two identical single phase transformers. | | | | | | | | |
| Expt. 3 | LOAD TEST ON SINGLE PHASE TRANSFORMERS | | | | | | | |
| Determination of efficiency by load test on a single phase transformer. | | | | | | | | |

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| Expt. 4 | SCOTT CONNECTION OF TRANSFORMERS |
| Conversion of three phase to two phase using single phase transformers | |
| Expt. 5 | SEPARATION OF CORE LOSSES IN SINGLE PHASE TRANSFORMER |
| Find out the eddy current and hysteresis losses in single phase transformer. | |
| Expt. 6 | HEAT RUN TEST ON SINGLE PHASE TRANSFORMERS |
| Determine the temperature rise in three single phase transformers set. | |
| Expt. 7 | BRAKE TEST ON THREE PHASE SQUIRREL CAGE INDUCTION MOTOR |
| Plot the performance characteristics of three phase induction motor. | |
| Expt. 8 | CIRCLE DIAGRAM OF THREE PHASE SQUIRREL CAGE INDUCTION MOTOR |
| Plot the circle diagram and predetermine the efficiency and losses of three phase squirrel cage induction motor | |
| Expt. 9 | REGULATION OF ALTERNATOR BY EMF METHOD |
| Determine the regulation of alternator using synchronous impedance method. | |
| Expt. 10 | REGULATION OF ALTERNATOR BY MMF METHOD |
| Determine the regulation of alternator using amperes turns method. | |
| Expt. 11 | SLIP TEST ON THREE PHASE SALIENT POLE SYNCHRONOUS MOTOR |
| Determination of X_d and X_q in a three phase salient pole synchronous motor. | |
| Expt. 12 | V' AND INVERTED 'V' CURVES OF SYNCHRONOUS MOTOR |
| Plot 'V' and inverted 'V' curves to study the effect of power factor in synchronous motor. | |
| Expt. 13 | EQUIVALENT CIRCUIT PARAMETERS OF SINGLE PHASE INDUCTION MOTOR |
| Determine the equivalent circuit parameters of a single phase induction motor | |
| Expt. 14 | STARTING AND SPEED CONTROL OF INDUCTION MOTOR USING PLC |
| Implementation of star-delta starter using PLC; Speed control of three phase slip ring induction motor with rotor resistance cutting using PLC. | |
| Reference Books: | |
| <ol style="list-style-type: none"> 1. P S Bimbhra, "Electrical Machines", Khanna Publishers, 2nd Edition, 2008. 2. M V Deshpande, "Electrical Machines", PHI Learning Private Limited, 3rd Edition, 2011. 3. R K Srivastava, "Electrical Machines", Cengage Learning, 2nd Edition, 2013. | |
| Web References: | |
| <ol style="list-style-type: none"> 1 https://www.ee.iitkgp.ac.in 2 https://www.citchennai.edu.in 3 https://www.iare.ac.in | |