

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: 45 | | Tutorial Classes: 15 | | Practical Classes: Nil | | Total Classes: 60 | | |
| <p>OBJECTIVES: The course should enable the students to:</p> <p>I. Evaluate losses and determine the efficiency of single phase and three phase electrical machines II. Determine the voltage regulation, efficiency and temperature rise in various transformers III. Apply PLC to gain practical knowledge</p> <p>COURSE OUTCOMES (COs)</p> <p>CO1: Analyze the performance characteristics of single phase transformer by conducting various direct and indirect tests CO2: Describe the performance characteristics and speed control of three phase induction motor using PLC CO3: Understand the various methods of calculating the voltage regulation of synchronous alternators CO4: Demonstrate V and inverted V curves of synchronous motors CO5: Understand the equivalent circuit parameters of single phase induction motor</p> <p>COURSE LEARNING OUTCOMES (CLOs)</p> <p>At the end of the course, the student will have the ability to:</p> <ol style="list-style-type: none"> 1. Calculate the efficiency and regulation of single phase transformer by conducting direct and indirect tests 2. Classify the different types of losses occurred in transformers and separate the each loss from other loss by conducting a suitable test. 3. Describe the operation of Scott connection to convert three phase supply to two phase supply or vice versa. 4. Describe the operation of Scott connection to convert three phase supply to two phase supply or vice versa. 5. Draw the performance characteristics of three phase induction motor by conducting direct test 6. Draw the circle diagram to find the efficiency of three phase induction motor by conducting no load and blocked rotor tests 7. Speed control of three of induction motor and implementation of star delta starter by using PLC 8. Estimate the regulation of an alternator by different methods of testing 9. Draw the 'V' and 'inverted-V' curves of synchronous motor and also determine the direct axis and quadrature axis reactance by slip test. 10. Determine the equivalent parameters of single phase induction motor by suitable tests. | | | | | | | | |

| LIST OF EXPERIMENTS | |
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| 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. | |
| 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 | V⁰⁰ AND INVERTED „V⁰⁰ CURVES OF SYNCHRONOUS MOTOR |
| Plot „V ⁰⁰ and inverted „V ⁰⁰ 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:

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:

- 1 <https://www.ee.iitkgp.ac.in>
- 2 <https://www.citchennai.edu.in>
- 3 <https://www.iare.ac.in>