**GOPALAN COLLEGE OF ENGINEERING AND MANAGEMENT**

Electronics and communication Department

Academic Year: 2016-17
Semester : Even

## 6. COURSE PLAN

Semester: II Subject Code: 15ELE25/CSE/CIVIL Subject Name: Basic Electrical Engineering Name of Subject Teacher: Sudha Rani J

Name of Subject Expert (Reviewer): Kavitha M V

For the Period: From: 06-08-16 to 02-06-16

Details of Book to be referred:

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| Text Books | **T1:** Basic Electrical Engineering, D. C. Kulshreshtha, 1st Edition,Revised |
| Reference Books | **R1**: Fundamentals of Electrical, Engineering, Rajendra Prasad PHI Third Edition 2014<br>**R2:** Basic Electrical Engineering AbhijitChakrabarti, Chandan Kumar Chanda, Sudiptanath |

| Lecture No | Topic Planned | Practical Applications & Brief objectives | Book referred with Pg No. | Planned Date | Executed Date | Deviation Reasons thereof | How Made Good / Reciprocate arrangement | Remarks by HOD | Remarks by Principal |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Introduction to the subject | | | 6/2/2017 | 6/2/2017 | Nil | | | |
| 2 | **Module.1**: DC Circuits and Electromagnetism Ohm's Law analysis of series, parallel circuits excited by independent voltage sources | **Objectives**:<br>• Define fundamental electric and magnetic properties.<br>2.Comprehend the fund mental laws of electric circuits- ohm's Law and Kirchhoff's laws<br>• Analyze dc series, parallel and series-parallel circuits.<br>• Design simple circuits for specified power and energy requirements.<br>• Distinguish between statistically and dynamically induced emf.<br>• Apply Faraday's law and lenz's law in magnetic circuits.<br>• Distinguish between statistically and dynamically induced emf.<br>• Apply Faraday's law and lenz's law in magnetic circuits. | T1: 2.3 | 7/2/2017 | 7/2/2017 | Nil | | | |
| 3 | Kirchhoff's Laws | | T1: 2.22 | 7/2/2017 | 7/2/2017 | Nil | | | |
| 4 | Power and Energy. | | T1:2.15 | 8/2/2017 | 8/2/2017 | Nil | | | |
| 5 | Illustrative examples on KVL & KCL | | Question Paper | 9/2/2017 | 9/2/2017 | Nil | | | |
| 6 | Illustrative examples on KVL & KCL | | Question Paper | 10/2/2017 | 10/2/2017 | Nil | | | |
| 7 | Illustrative examples on KVL & KCL | | Question Paper | 13/02/17 | 13/02/17 | Nil | | | |
| 8 | Electromagnetism: Review of field around a conductor, coil. Magnetic flux and flux density, magnetomotive force and magnetic field intensity, reluctance and permeability, | | T1:3.1 | 14/02/17 | 14/02/17 | Nil | | | |
| 9 | definition of magnetic circuit and basic analogy | | T1:3.2 | 14/02/17 | 14/02/17 | Nil | | | |

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| 10 | Electromagnetic induction : Definition of Electromagnetic Induction, Faradays Laws, Fleming's right hand rule, Lenz's Law | **Applications:**<br>**DC circuits:** Domestic, Automotive, Telecommunication, High-voltage power transmissions etc<br><br>**Electromagnetism**: Household appliances, Industrial Applications, Magnetic Levitation Trains, Communication Systems, Medical Systems etc<br><br>**Outcome:** Student will Know fundamental electric and magnetic properties. Be able to apply KVL and KCL for several circuits | T1:3.5 | 15/02/17 | 15/02/17 | Nil | | | |
| 11 | Statically and dynamically induced emf. Concept of self-inductance | | T1:3.6 | 16/02/17 | 16/02/17 | Nil | | | |
| 12 | Concept of mutual inductance | | T1:3.15 | 20/02/17 | | | | | |
| 13 | Force on current carrying conductor placed in a magnetic field, Fleming's left hand rule | | T1:3.8 | 20/02/17 | | | | | |
| 14 | Co-efficient of coupling. Energy stored in magnetic field. | | T1:3.16, 3.18 | 21/02/17 | | | | | |
| 15 | Illustrative examples | | Question Paper | 21/02/17 | | | | | |
| 16 | Illustrative examples | | Question Paper | 22/02/17 | | | | | |
| 17 | Illustrative examples | | Question Paper | 23/02/17 | | | | | |
| 18 | **Module 2: D.C.Machines :**<br><br>Working principle of D.C. Machine as a generator and a motor | **Objectives:**<br>• Understand the working of D.C. Machine as a generator and a motor.<br>• Analyze and understand constructional features. Types of armature | T1:9.1 | 27/02/17 | | | | | |
| 19 | Types and constructional features. Types of armature windings | | T1:9.8 | 28/02/17 | | | | | |

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| 20 | Emf equation of generator, relation between induced emf and terminal voltage with an enumeration of brush contact drop and drop due to armature reaction | windings<br>• Draw phasor diagrams for balanced three-phase star delta systems.<br><br>**Applications:**<br>• DC motor is used in several industrial and domestic appliances<br>• The concept of DC generator is used for generation of electrical DC power<br><br>**Outcome:**<br>• Understand Principle of operation of dynamometer type wattmeter<br>• Understand the working of D.C. Machine as a generator and a motor.<br>Know the necessity of a starter for a DC Motor. | T1:9.13 | 28/02/17 | | | | | |
| 21 | Illustrative examples | | T1:9.14 | 1/3/2017 | | | | | |
| 22 | Operation of D.C. motor, | | T1:9.21 | 2/3/2017 | | | | | |
| 23 | Types of D.C. motors, characteristics and applications. | | T1:9.26 | 3/3/2017 | | | | | |
| 24 | Necessity of a starter for D.C. motor. | | T1:9.29 | 4/3/2017 | | | | | |
| 25 | Illustrative examples on back emf and torque. | | T1:9.28 | 6/3/2017 | | | | | |
| 26 | Illustrative examples on back emf and torque. | | T1:9.29 | 7/3/2017 | | | | | |
| 27 | Illustrative examples on back emf and torque. | | T1:9.31 | 7/3/2017 | | | | | |
| 28 | **Measuring Instruments:** Introduction Construction and Principle of operation of dynamometer type wattmeter | | T1:7.8 | 8/3/2017 | | | | | |

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| 29 | Construction and Principle of operation of single phase induction type energy meter. | | T1:7.12 | 13/03/17 | | | | | |
| 30 | Unit Test 1 | | | 14/03/17 | | | | | |
| 31 | **Module.3:Single-phase A.C. Circuits:** Generation of sinusoidal voltage, frequency of generated voltage | **Objectives:**<br>• Understand the concept of 3Phase AC circuits.<br>• Draw phasor Diagrams for RLC circuits<br>• Analyze RL RC and RLC circuits.<br>• Understand the need of wiring, and how wiring is done for domestic purposes.<br><br>**Applications:**<br>AC supply and circuits are used for domestic applications, houses, schools, shops,..<br><br>**Outcomes:**<br><br>Knowledge on Electric shock, and precautions against shock, Earthling, Earth leakage circuit breaker. | T1:4.4 | 15/03/17 | | | | | |
| 32 | definition and numerical values of average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current | | T1:4.9 | 16/03/17 | | | | | |
| 33 | Phasor representation of alternating quantities. | | T1:4.14 | 17/03/17 | | | | | |
| 34 | Analysis, with phasor diagrams of R, L, C circuits | | T1:4.25 | 20/03/17 | | | | | |
| 35 | Analysis with R-L, R-C and R-L-C circuits | | T1:5.5 | 21/03/17 | | | | | |
| 36 | Analysis of series, parallel and series-parallel circuits | | T1:5.7 | 21/03/17 | | | | | |
| 37 | Real power, reactive power, apparent power and power factor | | T1:5.9 | 22/03/17 | | | | | |

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| 38 | Illustrative examples | | T1:5.11 | 23/03/17 | | | | | |
| 39 | Illustrative examples | | T1:5.12 | 24/03/17 | | | | | |
| 42 | Domestic Wiring: Service mains, meter board and distribution board. | | T1:8.2 | 27/03/17 | | | | | |
| 43 | Brief discussion on concealed conduit wiring. Two3way and three-way control. | | T1:8.5 | 28/03/17 | | | | | |
| 44 | Elementary discussion on Circuit protective devices: fuse and Miniature Circuit Breaker Electric shock, precautions against shock – Earthling, Earth leakage circuit breaker | | T1:8.12 | 28/03/17 | | | | | |
| 45 | Residual current circuit Breaker (RCCB). | | T1:8.6 | 30/03/17 | | | | | |
| 46 | **Module .4Three Phase Circuits** Necessity and advantages of three phase systems | **Objectives:**<br>• Understand the working of three phase power system.<br>• Analyze three phase ac generator. Draw phasor diagrams for balanced three-phase star delta systems.<br>• Derive expression for | T1:6.1 | 31/03/17 | | | | | |
| 47 | Generation of three phase power | | T1:6.6 | 3/4/2017 | | | | | |
| 48 | Definition of Phase sequence, balanced supply and balanced load. | | T1:6.5 | 4/4/2017 | | | | | |

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| 49 | Relationship between line and phase values of balanced star connection. | three-phase power.<br>• **Applications:**<br>Power consumed measurement, 3phase systems are used in large power consuming industries<br>**Outcome:**<br>• Analyze three phase ac generator. Draw phasor diagrams for balanced three-phase star delta systems.<br>• Implement two wattmeter method for power measurement.<br>• Choose equipment of proper rating for a given application. | T1:6.7 | 4/4/2017 | | | | | |
| 50 | Relationship between line and phase values of balanced delta connection. | | T1:6.10 | 5/4/2017 | | | | | |
| 51 | Power in balanced three phase circuits, | | T1:6.15 | 6/4/2017 | | | | | |
| 52 | Measurement of power by two-wattmeter method | | T1:6.17 | 7/4/2017 | | | | | |
| 53 | Determination power factor using wattmeter readings. | | T1:6.21 | 10/4/2017 | | | | | |
| 54 | Illustrative examples | | T1:6.22 | 11/4/2017 | | | | | |
| 55 | Illustrative examples | | T1:6.23 | 11/4/2017 | | | | | |
| 56 | **Synchronous generators:** Principle of operation, Types and constructional features | | T1:11.3 | 12/4/2017 | | | | | |
| 57 | Advantages of rotating field type alternator, Synchronous speed, | | T1:11.2 | 20/04/17 | | | | | |
| 58 | Frequency of generated voltage, Emf equation. Concept of winding factor. | | T1:11.14 | 21/04/17 | | | | | |
| 59 | Illustrative examples on emf equation. | | T1:11.15 | 24/04/17 | | | | | |
| 60 | Illustrative examples on emf equation. | | T1:11.17 | 25/04/17 | | | | | |

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| 61 | **Unit Test 2** | | | 25/04/17 | | | | | |
| 62 | **Module.5: Single Phase Transformers:**<br><br>Necessity of transformer, Principle of operation and | **Objectives:**<br>• Understand the need of a transformer.<br>• Understand the working of transformer.<br>• Derive the emf Equation of 1 phase transformer.<br>• Analyze the Condition for maximum efficiency, Voltage regulation and its Significance.<br>• A brief knowledge on Three Phase Induction Motors, its working principle.<br>• Applications of squirrel - cage and slip – ring motors.<br>**Applications:**<br>Transformers are used in all electrical systems, and equipments used in day today life to step up and step down the voltage<br><br>**outcomes:**<br>After the completion of the topic, the student will be able to predict the behavior of electrical and magnetic | T1:10.4 | 26/05/17 | | | | | |
| 63 | Construction of single-phase transformers (core and shell types) | | T1:10.14 | 27/04/17 | | | | | |
| 64 | Emf equation, losses, variation losses with respect to load, efficiency | | T1:10.5 | 28/04/17 | | | | | |
| 65 | Condition for maximum efficiency, Voltage regulation and its Significance | | T1:10.21 | 2/5/2017 | | | | | |
| 66 | Illustrative problems on emf equation and efficiency only. | | T1:10.23 | 2/5/2017 | | | | | |
| 67 | **Three Phase Induction Motors** :Principle of operation, Concept and | | T1:12.5 | 3/5/2017 | | | | | |
| 68 | production of rotating magnetic field Synchronous speed, rotor speed, Slip,Types and Constructional features | | T1:12.7 | 4/5/2017 | | | | | |
| 69 | Frequency of the rotor induced emf, Slip and its significance. | | T1:12.8 | 5/5/2017 | | | | | |

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| 70 | Applications of squirrel - cage and slip - ring | circuits realize the requirement of transformers in transmission and distribution of electric power and other applications | T1:12.8 | 8/5/2017 | | | | | |
| 71 | Motors. Necessity of a starter, starting of motor using stars-delta starter. | | T1:12.10 | 9/5/2017 | | | | | |
| 72 | Illustrative Examples | | T1:12.11 | 9/5/2017 | | | | | |
| 73 | **Unit Test 3** | | | 10/5/2017 | | | | | |
| 74 | **Revision and QP solving** | | | 11/5/2017 | | | | | |
| 75 | **Revision and QP solving** | | | 12/5/2017 | | | | | |
| 76 | **Revision and QP solving** | | | 18/05/17 | | | | | |
| 77 | **Revision and QP solving** | | | 19/05/17 | | | | | |
| 78 | **Revision and QP solving** | | | 22/05/17 | | | | | |

Prepared By: Sudha Rani J

Date & Sign_____

Reviewed by: Kavitha M V

Date & Sign_____

Approved by: Kavitha M V

Date & Sign _____