

| Course Document | | Academic Year:2016-17 | |
|--|----------------|-----------------------|---------------|
| Department of Electrical and Electronics Engineering | | | |
| Course Title : Basic Electrical Engineering | | | Credits: 4 |
| Course Code :16ELE13/23 | | | L:T:P -3-1-0 |
| Course Type: ES | Semester : 1 | Div: | CIE marks: 50 |
| Hours/week: 4 | Total Hours:50 | | SEE marks: 50 |

Pre-requisites: Fundamentals of Electricity, Magnetism, Electrochemistry, Calculus

Course Objectives:

1. To introduce fundamental concepts and analysis techniques in electrical engineering to students across all disciplines.
2. To introduce the students about domestic wiring, the functioning of various electrical apparatus and the safety measures. Emphasize the effects of electric shock and precautionary measures.
3. To impart basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
4. To provide knowledge about the basic DC and AC electric circuits and magnetic circuits.
5. To introduce the concepts of generators, motors, transformers and their applications.

Course Outcomes(COs) : At the end of the course, the student will be able to

[Outcomes usually follow the format: "At the end of the course, students will be able to *insert verb here + insert knowledge, skills, or attitudes the student is expected to develop*]

| CO No. | Course Outcomes (Action verb should be in italics) | Bloom's taxonomy | Bloom's Level |
|--------|---|------------------|---------------|
| CO-1 | <i>Demonstrate</i> an understanding of the basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context. [L2] | Applying | L 3 |
| CO-2 | <i>Demonstrate</i> an understanding of basic concepts of analysis of simple DC and AC circuits used in electrical and electronic devices.[L2] | Applying | L 3 |
| CO-3 | <i>Demonstrate</i> an understanding of selection skill to <i>identify</i> the type of generators or motors required for particular application.[L2] | Applying | L 3 |
| CO-4 | <i>Demonstrate</i> an understanding of basic concepts of transformers their <i>application</i> in transmission and distribution of electric power.[L2, L4] | Applying | L 3 |
| CO-5 | <i>Demonstrate</i> an understanding of the effects of electric shock and precautionary measures.[L2] | Applying | L 3 |

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|------|---|----------|-----|
| CO-6 | Apply the basic concepts in Electrical engineering for multi-disciplinary tasks.[L4] | Applying | L 3 |
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|---------------------------------------|------------------|
| Title of the Chapter : D.C. Circuits: | Unit No. : 1 |
| | Duration: 4 Hrs. |

Outcomes of this chapter:

At the end of the Chapter, the student will be able to

| S.No. | Outcomes | Bloom's Level |
|-------|---|---------------|
| 1 | Apply the concepts of Ohms law, series parallel combination of resistances, current division for analysis of DC circuits | L3 |
| 2 | Calculate current,voltage and power in various branches of electric DC circuits. | L3 |

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| Title of the Chapter : Magnetic Circuit: | Unit No. : 1 |
| | Duration: 6 Hrs. |

Outcomes of this chapter:

At the end of the Chapter, the student will be able to

| S.No. | Outcomes | Bloom's Level |
|-------|---|---------------|
| 1 | Describe the basic concepts of Electromagnetism , Faraday's laws of Electromagnetic induction, Lenz's law , types of induced emf, self and mutual inductance | L2 |
| 2 | Apply the concepts for the study and analysis of magnetic circuits and their applications | L3 |

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|-----------------------------------|------------------|
| Title of the Chapter: DC Machines | Unit No. : 2 |
| | Duration: 5 Hrs. |

Outcomes of this chapter:

At the end of the Chapter, the student will be able to

| S.No. | Outcomes | Bloom's Level |
|-------|--|---------------|
| 1 | Describe the principle of working of DC generator and DC motor, construction and types of DC machines and the electric circuit details | L2 |
| 2 | Calculate the performance quantities such as losses, efficiency, analyze performance characteristics and illustrate applications of DC machines | L3 |

| Title of the Chapter : Measuring Instruments | | Unit No. : 2 |
|---|---|------------------|
| | | Duration: 5 Hrs. |
| Outcomes of this chapter: At the end of the Chapter, the student will be able to | | |
| S.No. | Outcomes | Bloom's Level |
| 1 | Demonstrate an understanding of the basic principle of operation and construction of different types of electrical measuring instruments | L3 |
| 2 | Demonstrate an understanding of applications of different types of electrical measuring instruments . | L3 |

| Title of the Chapter : Single-phase A.C. Circuits | | Unit No. : 3 |
|---|--|------------------|
| | | Duration: 7 Hrs. |
| Outcomes of this chapter: At the end of the Chapter, the student will be able to | | |
| S.No. | Outcomes | Bloom's Level |
| 1 | Demonstrate an understanding of the basic concepts of Alternating current and voltage such as Amplitude, frequency, Average and RMS values, phasors, analysis of R, L, C series and parallel circuits. | L2 |
| 2 | Apply the phasor algebra approach in the analysis of AC circuits | L3 |

| Title of the Chapter : Domestic Wiring: | | Unit No. : 3 |
|---|--|------------------|
| | | Duration: 3 Hrs. |
| Outcomes of this chapter: At the end of the Chapter, the student will be able to | | |
| S.No. | Outcomes | Bloom's Level |
| 1 | Demonstrate an understanding of the Service mains, meter board and distribution board, concealed and conduit wiring, switching control schemes. Elementary discussion on | L3 |
| 2 | Demonstrate an understanding of the Circuit protective devices: fuse and Miniature Circuit Breaker (MCB's). Electric shock, precautions against shock, necessity of Earthing. | L3 |

| Title of the Chapter : Three Phase Circuits: | | Unit No. : 4 |
|---|--|-------------------------|
| | | Duration: 6 Hrs. |
| Outcomes of this chapter: | | |
| At the end of the Chapter, the student will be able to | | |
| S.No. | Outcomes | Bloom's Level |
| 1 | Demonstrate an understanding of three phase system, generation of three phase emf, phase sequence, balanced and unbalanced systems, line and phase values, balanced star and delta connections, Power in balanced three-phase circuits, measurements of active and reactive power and power factor. | L3 |
| 2 | Demonstrate an understanding of calculation of power and power factor in three phase systems, Advantages and disadvantages of three systems and their applications | L3 |

| Title of the Chapter : Transformer | | Unit No. : 4 |
|---|--|-------------------------|
| | | Duration: 4 Hrs. |
| Outcomes of this chapter: | | |
| At the end of the Chapter, the student will be able to | | |
| S.No. | Outcomes | Bloom's Level |
| 1 | Demonstrate an understanding of principle of operation and construction of single-phase transformer (core and shell type). Emf equation, transformation ratio, losses, efficiency, voltage regulation and its significance... | L3 |
| 2 | Demonstrate an understanding of performance of transformers through illustrative problems and applications of transformer | L3 |

| Title of the Chapter : Three Phase Induction Motor: | | Unit No. : 5 |
|---|---|-------------------------|
| | | Duration: 5 Hrs. |
| Outcomes of this chapter: | | |
| At the end of the Chapter, the student will be able to | | |
| S.No. | Outcomes | Bloom's Level |
| 1 | Demonstrate an understanding of principle of operation, types and construction of Induction motors, Slip and its significance. | L2 |
| 2 | Demonstrate an understanding of applications of squirrel cage and slip ring motors. | L3 |

| Title of the Chapter : Three phase Synchronous Generators | | Unit No. : 5 |
|---|--|------------------|
| | | Duration: 5 Hrs. |
| Outcomes of this chapter: At the end of the Chapter, the student will be able to | | |
| S.No. | Outcomes | Bloom's Level |
| 1 | Demonstrate an understanding of principle of operation, types and construction, Emf equation. Concept of winding factor | L2 |
| 2 | Demonstrate an understanding calculation of Generated emf and applications | L3 |

Books:

1. Author(s), Title of the book, Publisher, Edition, Year of publication

Activities planned for achievement of outcomes:

| Activities to be selected from following list (Partial list, more activities can be added by faculty) | Tick mark |
|--|-----------|
| 1. Assignments | |
| 2. Quizzes | |
| 3. Internal Assessment Tests | |
| 4. Course Seminar | |
| 5. Course Project (Mini project) | |
| 6. Case Studies | |
| 7. Viva-Voce | |

Mapping of COs and POs

| Course Outcomes | Activities (Mention the S.No.) | Program Outcomes | | | | | | | | | | | |
|-----------------|-----------------------------------|------------------|---|---|---|---|---|---|---|---|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| CO-1 | | | | | | | | | | | | | |
| CO-2 | | | | | | | | | | | | | |
| CO-3 | | | | | | | | | | | | | |
| CO-4 | | | | | | | | | | | | | |
| CO-5 | | | | | | | | | | | | | |
| CO-6 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Mapping of COs and PSOs

| Course Outcomes | Activities (Mention the S.No.) | Program Specific Outcomes | | | |
|-----------------|-----------------------------------|---------------------------|------|------|-----|
| | | PSO1 | PSO2 | PSO3 | ... |
| CO-1 | | | | | |
| CO-2 | | | | | |
| CO-3 | | | | | |
| CO-4 | | | | | |
| CO-5 | | | | | |
| CO-6 | | | | | |
| | | | | | |
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Note:

1. Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

It there is no correlation, put " - "

Name and signature of the faculty member