Course Outcomes & Assessment Plan

**F.E. (semester I)**

**Subject:** **Basic Electrical Engineering (FEC105)**

**Academic Term: *October 2022 -January 2023***

**Syllabus:**

| **Module** | **Contents** | **Hours** |
| --- | --- | --- |
| 1 | **DC Circuits:**  (only independent sources). Kirchhoff’s laws, Ideal and practical voltage and current source, Mesh and Nodal analysis ,super node and super mesh, Source transformation, Star-delta transformation, Superposition theorem, Thevenin’s theorem, Norton’s theorem, Maximum power transfer theorem. | 12 |
| 2 | **AC Circuits:**  Generation of alternating voltage and currents, RMS and Average value, form factor , crest factor, AC through resistance, inductance & capacitance, R-L , R-C and R-L-C series and parallel circuits, phasor diagrams , power and power factor, series and parallel resonance, Q-factor and bandwidth | 09 |
| 3 | **Three phase circuits:**  Three phase voltage and current generation, star and delta connections (balanced load only), relationship between phase and line currents and voltages, Phasor diagrams, Basic principle of wattmeter, measurement of power by one and two wattmeter method | 05 |
| 4 | **Single phase transformer:**  Construction, working principle, Emf equation, ideal and practical transformer, transformer on no load and on load, phasor diagrams, equivalent circuit, O.C. and S.C test, regulation and Efficiency | 06 |
| 5 | **Electrical machines**:  Rotating magnetic field produced by three phase AC, Principles of operation of three phase induction motor, concept of slip, constructional details and classification of Induction machines. | 02 |
| 6 | Principle of operation of single phase induction motors, stepper motor (single stack variable reluctance and permanent magnet) | 02 |
| Self-  study  Topic | Principle of operation of DC generators and DC motors, constructional details  and classification of DC machines, e.m.f equation of generator/motor, applications.  (Theory question can be asked in University exam, no numericals. The  percentage of marks allotted should be maximum of 10% (max. 08marks)) |  |

**Course Outcomes:**

*Upon completion of this course students will be able to*

**FEC105.1 Apply various network theorems to determine the circuit response/behavior. FEC105.2 Evaluate and analyze single phase AC circuit.**

**FEC105.3 Analyze three phase circuit.**

**FEC105.4 Explain the constructional features and operation of single phase Transformer.**

**FEC105.5 Illustrate the working principle of single phase and three phase machines.**

**Relationship of course outcomes with program outcomes:**

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **FEC105.1** | 3 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| **FEC105.2** | 3 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| **FEC105.3** | 3 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| **FEC105.4** | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **FEC105.5** | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |

**PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**Justification of PO to CO mapping:**

| **FEC105.1** | **PO1** | **Acquire the basics of DC circuits and apply the knowledge of mathematics for analyzing them.** |
| --- | --- | --- |
| **PO2** | **Analyze various DC network techniques for solving numerical problems** |
| **FEC105.2** | **PO1** | **Study the basics of single phase AC circuits.** |
|  | **PO2** | **Analyze AC networks** |
| **FEC105.3** | **PO1** | **Study three phase AC circuits .** |
| **PO2** | **Solve numerical problems on three phase AC circuits.** |
| **FEC105.4** | **PO1** | **Study features and operation of single phase transformer and analyze its performance parameters** |
| **FEC105.5** | **PO1** | **Acquire the basic knowledge of features and operation of DC machines** |

**1**

**Modes of delivery:**

| **Modes of Delivery** | **Brief description of content delivered** | **Mapped COs** | **Mapped POs** |
| --- | --- | --- | --- |
| Lectures using chalk and board, PPTs | All modules | CO1, CO2,CO3,CO4,  CO5 | PO1, PO2 |
| Videos | Generation of AC voltage and current  Double Field revolving Theory | CO2, CO4 | PO1 |

**CO Assessment Tools:**

| ***Course Outcome*** | ***Assessment Method*** | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Direct Method (80 %)*** | | | | | | | ***Indirect Method (20%)*** |
| Unit Tests | | Assignments | | Quiz | ESE | Laboratory Experiment | Course exit survey |
| UT1 | UT2 | A1 | A2 |  |  |
| **FEC105.1** | 20% |  | 20% |  |  | 50% | 10% | 100% |
| **FEC105.2** |  | 20% |  | 20% |  | 50% | 10% | 100% |
| **FEC105.3** |  | 20% |  | 20% |  | 50% | 10% | 100% |
| **FEC105.4** |  |  |  |  | 50% | 50% |  |  |
| **FEC105.5** |  |  |  |  |  |  | 100% |  |

**Attainment Level *vs* Target**

| **Test 1 & 2** | 60 % students score more than 50 % marks |
| --- | --- |
| **Laboratory** | 60 % students score more than 70 % marks |
| **Assignment** | 60 % students score more than 70 % marks |
| **Semester End Examination** | 50 % students score more than 50 % marks |
| **Course Exit Survey** | 75 % students rate more than 60% |

**Assignment:**

Two assignments including numerical examples will be given

**Rubrics for Tutorial Grading:**

| **Indicator** | **0** | **1** | **2** | **3** | **4** |
| --- | --- | --- | --- | --- | --- |
| Timeline (1) | Late submission | Timely submission | -- | -- | -- |
| C o r r e c t n e s s ( 4 ) | All answers wrong | Less than 30 % answers correct | 30-60% answers correct | 30-90% answers correct | All answers correct and adequately written with required steps |
| Understanding and  (4) | No t able to explain concepts | Able to explain concepts superficially | Able to explain the concepts but not the  related topics | Able to explain the concepts and the  related topics partially | Able to explain concepts and  related topics thoroughly |
| Neatness (1) | Untidy writing and diagrams | Neat writing and diagrams with appropriate labels |  |  |  |

**Laboratory Experiment**

Total six number laboratory experiments will be performed in the practical session as per the time schedule in the time table.

**Rubrics for Laboratory Experiment Grading:**

| **Indicator** | **0** | **1** | **2** | **3** |
| --- | --- | --- | --- | --- |
| Timeline (marks: 1) | Not submitted within 1 week after performance. | Submitted withing 1 week after performance. | -- | -- |
| Understanding (marks: 3) | No understanding of the experiment and related theory at all | Superficial understanding of the experiment | Understood the experiment but not the postlab. Question answers. | Understood to the experiment; theory (postlab.)as well as practical. |
| Lab. Performance (marks: 3) | Not performed the experiment | Not attentive in the group during lab. performance | Attentive but not active. | Active participation in lab. performance |
| Documentation (marks: 3)  Parameters:  Neatness, correctness,  completeness | All three parameters missing | Any two parameters missing | Any one parameter missing | Neat, correct and complete documentation |

Lesson Plan

***Faculty : Shilpa Patil***

| CLASS | | | | | F.E. Computer Engg. Div. A, Semester I | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Academic Term | | | | | November 2022 -January 2023 | | | | |
| Subject | | | | | **Basic Electrical and Electronics Engineering** | | | | |
| ***Periods (Hours) per week*** | | | ***Lecture*** | | | | ***5*** | | |
| ***Practical*** | | | | ***--*** | | |
| ***Tutorial*** | | | | ***--*** | | |
| ***Evaluation System*** | | |  | | | | ***Hours*** | ***Marks*** | |
| Theory examination | | | | 3 | 80 | |
| Internal Assessment | | | | -- | 20 | |
| Practical Examination | | | | -- | -- | |
| Oral Examination | | | | -- | 25 | |
| Term work | | | | -- | 25 | |
| Total | | | | -- | 150 | |
|  | | | | | | | | | |
| ***Time Table*** | | | ***Day*** | | | | ***Time*** | | |
| Tuesday | | | | 12.15 pm – 1.15 pm | | |
| Thursday | | | | 11.15 am – 12.15 pm | | |
| Friday | | | | 11.15 am – 12.15 pm | | |
| ***Course Content and Lesson plan*** | | | | | | | | | |
| ***Module 1:* DC Circuits (Only Independent Sources)** | | | | | | | | | |
| **Week** | **Lecture No.** | **Date** | | | | **Topic** | | | **Remarks(If any)** |
| **Planned** | | **Actual** | |
|  |  |  | |  | | **D. C. Circuits** | | |  |
| 1 | 1 | 15-11-2022 | | 15-11-2022 | | Fundamentals of Electric circuits | | |  |
| 2 | 17-11-2022 | | 17-11-2022 | | Series-parallel circuits | | |  |
| 3 | 18-11-2022 | | 18-11-2022 | | Star\_Delta conversion derivations | | |  |
| 2 | 4 | 22-11-2022 | | 22-11-2022 | | Star\_Delta conversion examples | | |  |
| 5 | 24-11-2022 | | 24-11-2022, | | KCL , KVL | | |  |
| 6 | 25-11-2022 | | 25-11-2022 | | Mesh Analysis | | |  |
| 3 | 7 | 29-11-2022 | | 29-11-2022 | | Nodal Analysis | | |  |
| 8 | 01-12-2022 | | 01-12-2022,  02-12-2022 | | Source Transformation | | |  |
| 9 | 02-12-2022 | | 06-12-2022 | | Superposition Theorem | | |  |
| 4 | 10 | 06-12-2022 | | 08-12-2022 | | Thevenin’s theorem | | |  |
| 11 | 08-12-2022 | | 09-12-2022 | | Norton’s theorem | | |  |
| 12 | 09-12-2022 | | 13-12-2022,  15-12-2022 | | Maximum Power Transfer theorem | | |  |
|  | **1 phase A.C.Circuits** | | | | | | | | |
| 6 | 13 | 13-12-2022 | | 16-12-2022 | | Generation of AC | | |  |
| 14 | 15-12-2022 | | 20-12-2022 | | AC fundamental | | |  |
| 15 | 16-12-2022 | | 27-12-2022 | | Examples on Average, RMS value | | |  |
| 7 | 16 | 20-12-2022 | | 29-12-2022 | | Representation of ac quantities: polar,  rectangular coordinate form, phasor diagrams | | |  |
| **Unit Test 1** | | | | | | | | |
| 8 | 17 | 27-12-2022 | | 30-12-2022 | | R-L ckts, analysis and numerical problems | | |  |
| 18 | 29-12-2022 | | 03-01-2023 | | R-C ckts, analysis and numerical problems | | |  |
| 19 | 30-12-2022 | | 05-01-2023 | | R-L-C ckts analysis and numerical problems | | |  |
| 9 | 20 | 03-01-2023 | | 06-01-2023 | | R-L-C ckts numerical problems | | |  |
| 21 | 05-01-2023 | | 10-01-2023 | | R-L-C Series Resonance | | |  |
| 22 | 06-01-2023 | | 12-01-2023 | | R-L-C Parallel Resonance | | |  |
| 10 | 23 | 10-01-2023 | | 13-01-2023 | | Practice problems | | |  |
| **3 phase A.C.Circuits** | | | | | | | | |
| 24 | 12-01-2023 | | 17-01-2023 | | Generation of 3 phase, advantages of 3  phase, representation | | |  |
| 25 | 13-01-2023 | | 19-01-2023 | | Star ckt- phase-line relation | | |  |
| 11 | 26 | 17-01-2023 | | 20-01-2023 | | Delta ckt- phase-line relation | | |  |
| 27 | 19-01-2023 | | 24-01-2023 | | Numerical problems | | |  |
| 28 | 20-01-2023 | | 27-01-2023 | | Power measurement by one and two wattmeter method | | |  |
| 12 | 29 | 24-01-2023 | | 31-01-2023 | | Numerical problems | | |  |
| **3 phase Induction motor** | | | | | | | | |
| 30 | 27-01-2023 | | 02-02-2023 | | Construction, Rotating magnetic field | | | Video shared |
| 13 | 31 | 31-01-2023 | | 04-02-2023 | | Working Principle, advantages and applications | | |
| **1 phase Induction motor** | | | | | | | | |
| 32 | 02-02-2023 | | 02-02-2023 | | Working Principle , Double field revolving theory | | |  |
| 33 | 04-02-2023 | | 04-02-2023 | | Types of 1 phase I. M., applications | | |
| **Unit Test 2** | | | | | | | | | |

# Text- Books:

| 1. | Electrical engineering  fundamentals | Vincent Del-torro | PHI 2nd edn, 2011 |
| --- | --- | --- | --- |
| 2. | Basic Electrical Engineering | Mittle and Mittal | Tata McGraw Hill |
| 3. | Basic Electrical and Electronics Engineering | S.K. Bhattacharya | Pearson Education |
| 4. | Theory and problems in Electrical  engineering | I. J. Nagrath & Kothari | PHI 13nd edn, 2011 |
| 5. | Basic Electrical Engineering | B. R. Patil | Oxford Publications |

**Internal Assessment:** 20 marks (Average of two tests of 20 marks each)

**Term Work:** 25 marks

**Oral Examination:** 25 marks

| **Submitted By** | **Approved By** |
| --- | --- |
| Prof. Shilpa Patil | Dr. D.V. Bhoir |
| Sign: | Sign: |
| **Date of Submission: 26/11/2022** | **Date of Approval:** |
| **Remarks by PAC (if any)** | |