

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned				
		Theory	Pract.	Tut.	Theory	Tut.	Pract.	Total	
FEC105	Basic Electrical Engineering	3	--	--	3	--	--	3	
Course Code	Course Name	Examination Scheme							
		Theory					Term Work	Pract. /oral	Total
		Internal Assessment			End Sem. Exam.	Exam. Duration (in Hrs)			
		Test1	Test 2	Avg.					
FEC105	Basic Electrical Engineering	20	20	20	80	3	--	--	100

### Objectives

1. To provide knowledge on fundamentals of D.C. circuits and single phase and three phase AC circuits and its applications.
2. To inculcate knowledge on the basic operation and performance of 1- $\Phi$  transformer.
3. To provide knowledge on fundamentals of DC and AC machines.

### Outcomes: Learner will be able to...

1. Apply various network theorems to determine the circuit response / behavior.
2. Evaluate and analyze 1- $\Phi$  circuits.
3. Evaluate and analyze 3- $\Phi$  AC circuits.
4. Understand the constructional features and operation of 1- $\Phi$  transformer.
5. Illustrate the working principle of 3- $\Phi$  machine.
6. Illustrate the working principle of 1- $\Phi$  machines.

Module	Detailed Contents	Hrs.
<b>Prerequisite</b>	Resistance, inductance, capacitance, series and parallel connections of resistance, concepts of voltage, current, power and energy and its units. Working of wattmeter, Magnetic circuits, MMF, Magnetic field strength, reluctance, series and parallel magnetic circuits, BH Curve, Time domain analysis of first order RL and RC circuits	--
<b>01</b>	DC Circuits: (Only independent source) Kirchhoff's Laws, Ideal and practical Voltage and current Sources, Source Transformation, Mesh and Nodal Analysis, Star-Delta / Delta-Star Transformations, Superposition, Thevenin's Theorem, Norton's Theorem and Maximum Power Transfer Theorem.	12
<b>02</b>	AC Circuits :Generation of alternating voltage, basic definitions, average and r.m.s values, phasor and phase difference, sums on phasors, Single-phase ac series and parallel circuits consisting of R, L, C, RL, RC, RLC combinations, definitions - real, reactive and apparent power, admittance (Y), Series and parallel resonance, Q factor	10
<b>03</b>	Generation of Three-Phase Voltages, voltage & current relationships in Star and Delta Connections, power measurement in three phase balanced circuit(Only two wattmeter method).	04

04	Transformers: Working principle of single-phase transformer, EMF equation of a transformer, Transformer losses, Actual (practical) and ideal transformer, Phasor diagram (considering winding resistance and magnetic leakage), Equivalent circuit, Open-circuit test (no-load test), short circuit (SC) test, efficiency.	06
05	Electrical Machines (Numerical not expected): Rotating magnetic field produced by three phase ac, principle of operation of Three-phase induction motor, constructional details and classification of Induction machines.	02
06	Principle of operation of Single-Phase induction motors, stepper motor (Single stack variable reluctance and permanent magnet) (Numerical not expected)	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))	--

### **Assessment:**

#### **Internal Assessment Test:**

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 35% syllabus is completed. Duration of each test shall be one hour.

#### **End Semester Theory Examination:**

1. Question paper will comprise of total 06 questions, each carrying 20marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 5 marks will be asked.
4. Remaining questions will be mixed in nature. (e.g. Suppose Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hrs as mentioned in the syllabus.

#### **Text Books:**

1. V. N. Mittal and Arvind Mittal "Basic Electrical Engineering" Tata McGraw Hill, (Revised Edition)
2. Vincent Del Toro "Electrical Engineering Fundamentals", PHI Second edition, 2011
3. Edward Hughes "Hughes Electrical and Electronic Technology", Pearson Education (Tenth edition)
4. D P Kothari and I J Nagrath "Theory and Problems of Basic Electrical Engineering", PHI 13th edition 2011.
5. M. Naidu, S. Kamakshiah "Introduction to Electrical Engineering" McGraw-Hill Education, 2004
6. B.R Patil "Basic Electrical Engineering" Oxford Higher Education

#### **References:**

1. B.L. Theraja "Electrical Engineering " Vol-I and II.
2. S.N. Singh, "Basic Electrical Engineering" PHI, 2011 Book