

Course Code	Course Name	Teaching Scheme (Contact Hours)			Credits Assigned			
		Theory	Pract.	Tut.	Theory	TW/Pract	Tut.	Total
FEC105	Basic Electrical Engineering	04	02	-	04	01	-	05

Course Code	Course Name	Examination Scheme							
		Theory				Term Work	Pract	Oral	Total
		Internal Assessment			End Sem Exam				
		Test1	Test2	Av of Test 1 & 2					
FEC105	Basic Electrical Engineering	20	20	20	80	25	--	25	150

### Objectives

1. To provide knowledge on fundamentals of D.C. circuits and its applications.
2. To impart knowledge on fundamentals of 1- $\Phi$  A.C. circuits and its applications.
3. To inculcate knowledge on the basic operation and the performance of 1- $\Phi$  transformer.
4. To impart knowledge on fundamentals of 3- $\Phi$  A.C. circuits and its applications.
5. To provide knowledge on fundamentals of DC machines.

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

1. To evaluate D.C. circuits using network theorems.
2. To evaluate 1- $\Phi$  AC circuits.
3. To illustrate constructional features and operation of 1- $\Phi$  transformer.
4. To evaluate 3- $\Phi$  AC circuits.
5. To illustrate working principle of DC machines.
6. To conduct experiments on D.C. circuits and AC circuits.

Module	Detailed Contents	Hrs.
01	<b>DC Circuits(Only Independent Sources):</b> Kirchhoff 's laws, Ideal and practical voltage and current source, Mesh and Nodal analysis, Super node and Super mesh analysis, Source transformation, Star-delta transformation, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, (Source transformation not allowed for Superposition theorem, Mesh and Nodal analysis).	18
02	<b>AC Circuits:</b> Generation of alternating voltage and currents, RMS and Average value, form factor, crest factor, AC through resistance, inductance and 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.	12
03	<b>Three Phase Circuits:</b> 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 methods.	06
04	<b>Single Phase Transformer:</b> Construction, working principle, emf equation, ideal and practical transformer, transformer on no load and on load, phasor diagrams, equivalent circuit, OC and SC test, regulation and efficiency.	12
05	<b>DC Machines:</b> Principle of operation of DC motors and DC generators, construction and classification of DC machines, emf equation.	04

**Term work:**

Term work consists of performing minimum 06 practical mentioned as below.

Final certification and acceptance of the term work ensures satisfactory performance of laboratory work.

The distribution of marks for term work shall be as follows:

Attendance (Theory and Practical)	: 05 marks
Laboratory work (Experiment/journal)	: 10 marks
Assignments	: 10 marks

**List of laboratory experiments (Minimum Six):**

1. Mesh and Nodal analysis.
2. Verification of Superposition Theorem.
3. Verification Thevenin's Theorem.
4. Study of R-L series and R-C series circuit.
5. R-L-C series resonance circuit
6. R-L-C parallel resonance circuit.
7. Relationship between phase and line currents and voltages in three phase system (star & delta)
8. Power and phase measurement in three phase system by one wattmeter method.
9. Power and phase measurement in three phase system by two wattmeter method.
10. OC and SC test on single phase transformer

**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 20 marks.
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 3 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. Electrical Engineering Fundamentals" by Vincent Del Toro, PHI Second edition, 2011
3. Edward Hughes: Electrical and Electrical Technology, Pearson Education (Tenth edition)
4. D P Kothari and I J Nagrath "Theory and Problems of Basic Electrical Engineering", PHI 13th edition 2011.

**Reference Books:**

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