



Code No. : 5425/N

FACULTY OF ENGINEERING
B.E. 2/4 (EE) II Sem. (New) (Main) Examination, May/June 2012
ELECTRICAL MACHINERY – I

Time : 3 Hours]

[Max. Marks : 75

Note : Answer **all** questions from Part – A. Answer **any five** questions from Part – B.

PART – A

25 Marks

1. Define field energy and co-energy. 2
2. The magnetic flux density on the surface of an iron face is 1.6T which is a typical saturation level value for ferromagnetic material. Find the force density on the iron face. 3
3. State the different types of dc generators with their applications. 3
4. Define armature reaction in dc generators. 2
5. Explain the necessity of a starter for a dc shunt motor. 3
6. Mention the various methods of speed control of a dc series motor. 2
7. What is meant by an ideal transformer and a practical transformer ? 3
8. Define regulation of a transformer. 2
9. List out the applications of a stepper motor. 2
10. Differentiate between core and shell-type transformers. 3

PART – B

50 Marks

11. a) Explain about multiply-excited magnetic field systems. 5
b) Describe about the energy in magnetic systems. 5
12. a) A 75 kW, 250 V compound dc generator has the following data $R_a = 0.04\Omega$, $R_{se} = 0.004\Omega$, $R_f = 100\Omega$, brush contact drop, $V_b = 2V$ (1 volt each brush). Compare the generator induced emf when fully loaded in i) long shunt compound and ii) short shunt compound. 5
b) Explain about the parallel operation of dc generators. 5



13. a) With a neat schematic diagram, explain the procedure of Hopkinson's test. 5
b) Explain four-point starter for starting dc motor. 5
14. a) A 3-phase transformer bank consisting of three 1-phase transformers is used to step-down the voltage of a 3-phase, 6600 V transmission line. If the primary line current is 10 A, calculate the secondary line voltage, line current and output kVA for the following connections : a) Y/Δ and b) Δ/Y . The turns ratio is 12. Neglect losses. 5
b) Describe about the variable-reluctance and permanent-magnet stepper motors. 5
15. a) Explain how the Sumpner's test is performed on a single phase transformer. 5
b) The following data were obtained on a 20 kVA, 50 Hz, 2000/200 V distribution transformer :

	Voltage (V)	Current (A)	Power (W)
OC test with HV open-circuited	200	4	120
SC test with LV short-circuited	60	10	300

Draw the approximate equivalent circuit of the transformer referred to the HV and LV sides respectively. 5

16. a) Derive the emf equation of a generator. 5
b) Explain about Scott connection of a three-phase transformer. 5
17. a) A 240 V dc shunt motor runs on no-load at 800 rpm with no extra resistance in the field or armature circuit, the armature current being 2 A. Calculate the resistance required in series with the shunt winding so that the motor may run at 950 rpm when taking a line current of 30 A. Shunt winding resistance is 160Ω , armature resistance is 0.4Ω . Assume that flux is proportional to field current. 5
b) Explain about OC and SC tests of a transformer. 5