

FACULTY OF ENGINEERING**B.E. 2/4 (E&EE) II-Semester (Main) Examination, April / May 2013****Subject : Electrical Machinery-I****Time : 3 Hours****Max. Marks: 75****Note: Answer all questions of Part - A and answer any five questions from Part-B.****PART – A (25 Marks)**

1. Define field energy and co-energy. (3)
2. What do you understand by magnetically induced emf? (2)
3. What is meant by dummy coils and for what purpose these coils are used? (3)
4. Draw connection diagram for a short shunt compound machine. (2)
5. What are the functions of no-volt rebase in a 3-point starter? (2)
6. What would happen if the d.c. motor is directly switched on to the supply, without any starter? (3)
7. In a 1-phase transformer, why core flux remains substantially constant and is independent of the load current. (2)
8. Draw circuit diagram to conduct the Sumpner's test on two identical transformers. (3)
9. What are the applications of stepper motor? (2)
10. Draw connection diagram and vector diagram for a 3-phase delta/ delta transformer. (3)

PART – B (5x10=50 Marks)

11. Draw schematic diagram of a doubly excited magnetic system and derive expression for the magnetic force and torque developed in doubly excited systems. (10)
- 12.(a) A 250 k.w. , 400v, 6-pole dc generator has 720 lap wound conductor. It is given a brush lead of 2.5 angular degrees (mech) from the geometric neutral. Calculate the cross and damaging flux per pole, weight the shunt field current. (5)
- (b) Explain effect of armature reaction in d.c. machines. (5)
13. A 230 v dc shunt motor has an armature circuit resistance of 0.4Ω and field resistance of 115Ω . This motor drives a constant torque load and takes an armature current of 20A at 800 rpm. If motor speed is to be raised from 800 to 1000 rpm, find the resistance that must be inserted in the shunt field circuit. Assume magnetization curve to be a straight line. (10)
- 14.(a) Explain the Hopkinson test with neat circuit diagram. (5)
- (b) Derive the emf equation of a DC machine from basics. (5)
15. Explain the following in brief: (10)
 - (a) Schematic diagram of permanent magnet stepper motor.
 - (b) Torque-angle characteristics of stepper motor
 - (c) Derive circuit of stepper motor
- 16.(a) Explain excitation phenomenon of 1-phase transformer with help of neat diagram. (5)
- (b) Explain 3-phase to 2-phase conversion of a transformer with neat circuit diagram and vector diagram. (5)
17. When a 20 KVA, 3300 /220 v, 50Hz transformer is operated on rated voltage at no load, its power input is 160w at pf of 0.15, Under rated load conditions, the voltage drops in the total resistance and total leakage reactance are respectively 1 and 3 percent of rated voltage. Calculate input power 14.96 kw at 220v at 0.8 pf lagging to a load on LV side. (10)