**Reg. No. \_\_\_\_\_\_\_\_**

**Karunya University**

**(Karunya Institute of Technology and Sciences)**

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

**Supplementary Examination - June 2011**

**Subject Title: DC MACHINES AND TRANSFORMERS Time: 3 hours**

**Subject Code: EE250 Maximum Marks: 100**

#### **Answer ALL questions**

**PART – A (10 x 1 = 10 MARKS)**

1. What is the nature of emf induced in dc machine armature coils?

2. Which type of dc armature winding requires equalizer rings?

3. Under what condition, the mechanical power developed in a dc motor will be maximum?

4. What is the effect of change in supply voltage on the speed of a D.C. shunt motor?

5. What is meant by turns ratio in transformer?

6. Define voltage regulation of transformer.

7. What is Sumpner’s test?

8. Why is short circuit test performed on HV side?

9. Why is it not possible to operate Y –Δ transformer in parallel with Y –Y transformer?

10. What is total load capacity of V-V bank as compared with a Δ - Δ bank?

**PART – B (5 x 3 = 15 MARKS)**

11. Why are carbon brushes preferred for dc machines?

12. Why is a starter required to start a dc motor?

13. Draw the phasor diagram for a single phase transformer on no-load.

14. What is the purpose of conducting Open -Circuit and Short Circuit test on transformer?

15. What are the disadvantages of open delta connection?

**PART – C (5 x 15 = 75 MARKS)**

16. a. Derive from fundamental principles the EMF equation of a d.c. generator. (7)

b. A short shunt dc compound generator supplies 200A at 100 V. The resistances of armature, series field and shunt field winding resistances are 0.04, 0.03, and 60 ohms respectively. Find the EMF generated. Also find the EMF generated if the same machine is connected as a long shunt machine. (8)

(OR)

17. a. What is an armature reaction and explain its effect, with the necessary diagram, on the armature voltage? How it can overcome? (8)

b. A separately excited dc generator when running at 1200 rpm supplies a 200 A at 125 V to a circuit of constant resistance. What will be the current when the speed is dropped to 1000 rpm and field current is reduced to 80%? Armature resistance is 0.04 Ω, and total drop at brushes 2 V. Ignore saturation and armature reaction. (7)

18. a. What is the function of a No- Voltage Release (NVR) coil provided in a dc motor starter?

(5)

b. What are the factors controlling the motor speed? Discuss the flux control method of speed control of dc shunt motor. (10)

(OR)

[P.T.O]

19. The Hopkinson’s test two identical shunt machines gave the following test results: Line Voltage 230V; Line current excluding field currents 50 A: motor armature current 380 A: field currents, 5A and 4.2 A; armature resistance of each machine 0.025Ω; Calculate the efficiency of each machine at this load condition.

20. A 250/500V, single phase transformer has a primary resistance of 0.2 Ω and leakage reactance of 0.5 Ω. The corresponding values for the secondary are 0.82 Ω and 2.1 Ω respectively. Find the secondary terminal voltage and voltage regulation when the primary draws a current of 40A at 0.8 p.f. leading from the supply.

(OR)

21. a. In a 50kVA transformer, the iron loss is 400 W and full load copper loss is 600 W. Estimate its efficiency at (i) full load, UPF and (ii) half full load, 0.8 p.f.

b. State the formula for the efficiency of a transformer. Also derive the condition for maximum efficiency of the transformer.

22. a. A 220/440 V single phase transformer gave the following results:

OC test: 220 V, 1 A, 70 W on LV side SC test: 20V, 12 A, 100 W on HV side.

Draw the equivalent circuit of the transformer referred to (i) LV side and (ii) HV side and fill in the values of circuit parameters.

b. State the necessary and essential conditions of parallel operation of two single three phase transformer.

(OR)

23. A 10 kVA , 115/115 V single phase, 50 Hz transformer has a full load efficiency of 97% at UPF and has an iron loss of 109 W. The transformer is now connected as an Auto – Transformer to a 230 V supply. If it delivers a load of 10 kW at UPF to a 115 V circuit, calculate the efficiency of operation.

24. Explain the Scott connection of transformers for three phases to two phase conversion. Draw the necessary diagrams.

(OR)

25. Discuss briefly the construction and principles of the operation of current transformer. Draw the necessary diagrams.