(Pages : 3) **8716**

Reg. No. : .....

Name : .....

Third Semester B.Tech. Degree Examination, December 2015

(2008 Scheme)

Branch : Electrical and Electronics

08.306 : ELECTRICAL MACHINES – I (E)

Time : 3 Hours Max. Marks : 100

Instructions: *Answer **all** questions from Part – **A** (4 marks **each**) and **any one full** question of Part – **B** from **each** Module (**20** marks **each**).*

PART – A

1. Mention the conditions for self excitation of a DC generator.
2. Explain why compensating windings are needed in large DC machines and show how they are connected to the machine.
3. A 4 pole DC shunt generator with a lap connected armature having field and armature resistance of 50 Ω and 0.1 Ω resp. supplies 60 numbers of 100 V, 40 W lamps. Calculate the current per armature path.
4. How the critical speed is related to the field resistance of a DC generator ?
5. Mention the different braking methods of DC motors.
6. A DC series motor develops a torque of 20 Nm at a load current of 3 A. Find the torque developed in the machine if the load current is doubled.
7. Briefly explain how the speed of a DC motor is controlled above its rated value.
8. Draw and explain the equivalent circuit of an ideal transformer.
9. Write a short note on transformer harmonics.
10. What is meant by oscillating neutral and how it can be rectified in 3 phase transformers ?

P.T.O.

PART – B

Module – I

11. a) Explain with suitable diagram, the constructional features of a highly efficient DC machine.

    b) A 4 pole DC shunt generator with a shunt field resistance of 90Ω and armature resistance of 1Ω has 600 wave connected armature conductors. The flux per pole is 30 mWb. If the load resistance of 10Ω is connected across the armature terminals and the generator is drivern at 1000 rpm, calculate the power absorbed by the load.

OR

12. a) Derive the emf equation of a DC generator and hence deduce the open circuit characteristic.

    b) A long shunt dynamo running at 1000 rpm supplies 25 kW at a terminal voltage of 250 V. The resistance of the armature, shunt field and series field are 0.15 Ω, 100Ω and 0.05 Ω resp. The overall efficiency at this load is 88%. Find the :
    a) Cu loss
    b) Iron and friction losses
    c) Torque exerted by the prime mover.

Module – II

13. a) Derive the torque equation of a DC motor and hence deduce the mechanical and electrical characteristics of different types of DC motors.

    b) A 220 V DC shunt motor has an armature resistance of 0.5Ω and takes a current of 40 A on full load. By how much the main flux be reduced to raise the speed by 50%, if the developed torque is a constant.

OR

14. a) Describe the method to test two identical shunt machines simultaneously at full load conditions. Mention the merits of the test.

    b) An 8 pole, 240 V wave connected DC shunt motor gives 11.19 kW when running at 1000 rpm and drawing armature and field currents of 50 A and 1 A resp. It has 600 conductors with resistance 0.1 Ω. Assuming a brush drop of 1V/brush, find the useful flux per pole, armature and shaft torque, rotational losses and efficiency.

Module – III

15. a) Draw the Phasor diagram of a single phase transformer for an inductive load. Mention the relevant equations.

    b) A 600 kVA, single phase transformer when working at upf has an efficiency of 92% at full load and half load. Determine the efficiency when it operates at upf and 75% of full load.

OR

16. a) Explain the conditions for paralleling two, 3 phase transformers.

    b) A 50 kVA transformer has a maximum efficiency of 96% occurs at full load at upf condition. It operates on full load for 4 hours, half load for 3 hours, quarter load for 10 hours and at negligible out for the remainder of the day. Calculate the all day efficiency.
