PVP 12

Code: EE3T1

II B.Tech - I Semester – Regular Examinations - January 2014

ELECTRICAL MACHINES - I

(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1 a) Explain Lap winding and Wave winding with neat sketches of full pitch winding. For high current applications which type of winding is used and why? 7 M

b) Explain the classification of DC generators. 7 M

2 Explain in detail the effect of armature reaction in dc generator and its compensation techniques. 14 M

3 a) Draw the internal and external characteristics of a DC Shunt generator. State the reasons for the shape of the curve. 7 M

b) The relation between excitation current and emf generated by a DC shunt wound generator running on open circuit at 850 rpm is as follows:

Excitation (Amperes):	2	3	4	5	6
EMF (Volts):	68	87	100	109	112

The shunt field resistance is 22.2 Ω. Find the voltage at the terminals of the machine when it runs at 850 rpm self excited. 7 M

4 a) Explain the need for parallel operation of generators and conditions for parallel operation. 7 M

b) What is compensating winding in a DC machine? Where is it placed? Explain the purpose of using equalizer rings. Why are equalizer rings not needed for wave winding? 7 M

5 a) Compare the Speed-torque characteristics of DC shunt and series motors. Explain the shape of the curve with supporting equations. 7 M

b) A 60 kW 250V shunt motor takes 16 A when running light at 1440 rpm. The resistance of the armature and field are 0.2Ω and 125Ω respectively when hot

i) Estimate the efficiency of the motor when it takes 152 A.
ii) Also estimate the efficiency if working as a generator and delivering a load current of 152A at 250V. 7 M

6 a) Explain the methods of speed control in a DC shunt motor. 7 M

b) Explain the necessity of a starter and write about 3 point starter. 7 M

7 a) Compare the Swinburne's test and brake test for determining the efficiency of the DC machine. 7 M

b) On braking the armature circuit of a separately excited motor, the emf induced in the armature falls from 200V to 190V in 30 sec. If a current of 10A is taken from the armature by connecting to it a resistance immediately after disconnecting it from the supply, the same fall in emf takes 20 sec. Find the stray losses. 7 M

8 a) Explain the principle of cross filed dynamos and its applications. 7 M

b) Discuss the principle, operation and applications of Metadyne. 7 M