Code: EE3T2

II B.Tech - I Semester–Regular/Supplementary Examinations – November 2017

ELECTRICAL MACHINES - I
(ELECTRICAL AND ELECTRONICS ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer *all* the questions.   All questions carry equal marks

11x 2 = 22 M

1. a) Why are the pole shoes made as large as 70% of pole pitch in the dc machine?

   b) What are inter-poles, their purpose, location and excitation? Explain each item.

   c) What is the effect of magnetic saturation on the external characteristics of a dc shunt machine?

   d) What are the conditions to be fulfilled for parallel operation of two or more dc shunt generators?

   e) Why the E.M.F generated in the armature of a D.C motor is called 'back e.m.f'

   f) What is the function of no-volt release coil in a three-point starter?

   g) Based on EMF and torque equation compare the two methods of speed control of a dc motor.

   h) Why Swinburne's test cannot be performed on dc series machines?

i) Why is series compensating winding employed in the amplidyne ?

j) List out the application of universal motor?

k) What are the losses in a D.C machine?

PART – B

Answer any **THREE** questions.   All questions carry equal marks.   3 x 16 = 48 M

2. a) Enumerate and explain the methods used for improving commutation.   8 M

b) A 22.38 KW, 440V, 4-pole wave-wound d.c shunt motor has 840 armature conductors and 140 commutator segments. Its full-load efficiency is 88% and the shunt field current is 1.8 A. If brushers are shifted backward through 1.5 segments from the geometrical neutral axis. Find the demagnetizing and distorting amp-turn/pole.

                                                                                8 M

3. a) Draw the internal and external characteristics of different types of DC generators and explain them.   8 M

b) Two d.c generators are connected in parallel are connected in parallel to supply a load of 1500A. one generator has an armature resistance of 0.5 Ω and an e.m.f of 400V while the other has an armature resistance of 0.04 Ω and an e.m.f of 440V . The resistance of shunt

fields are 100 Ω and 80Ω respectively. Calculate the currents I₁ and I₂ supplied by individual generator and terminal voltage V of the combination.   8 M

4. a) Draw different characteristics of shunt, series and compound motors.   8 M

   b) With a neat sketch explain the construction and working of a 3 point starter. What are the limitations of 3 point starter?   8 M

5. a) What are the different speed control methods of DC shunt motor? Explain each method and enumerate advantages and disadvantages.   8 M

   b) The Hopkinson's test on two shunt machines gave the following results for full-load. Line voltage=250V; current taken from the supply system excluding field currents=50A; motor armature current =380A; field currents 5 A and 4.2 A. Calculate the efficiency of the machine working as a generator. Armature resistance of each machine is 0.2 Ω.   8 M

6. a) Explain the constructional features and principle of operation of amplidyne .   8 M

   b) What is three brush generator? Explain its principle of operation.   8 M