

B.E. Fourth Semester (Elect. Engineering (Elect. & Power Elect.)) (CGS)
10542 : Electrical Machine - I : 4 EP 01 / 4 EX 01 / 4 EL 01 / 4 EE 01

P. Pages : 2

Time : Three Hours



AU - 2580

Max. Marks : 80

- Notes :
1. All question carry equal marks.
 2. Answer **three** question from Section A and **three** question from Section B.
 3. Due credit will be given to neatness and adequate dimensions.
 4. Assume suitable data wherever necessary.
 5. Illustrate your answer necessary with the help of neat sketches.
 6. Use of pen Blue/Black ink/refill only for writing the answer book.

1. a) What is armature reaction? Explain its effect on the operation of D.C. machine. 7
- b) A 30kW, 300V D.C. shunt generator has armature and field resistance of 0.05Ω and 100Ω resp. Calculate the total power developed by the armature when it delivers full load output. 6

OR

2. a) Compare Lap winding and wave winding in case of D. C. machine. 7
- b) A D. C. shunt generator runs at 400 r.p.m. and delivers 500kW to bus bar having a constant voltage of 400V. Assuming the field excitation to be constant at 5A. Calculate the speed at which the generator must run if the load on it is to be reduced to 300 kW. The armature resistance is 0.015Ω . 6
3. a) Explain the parallel operation of two D. C. Series Generator. 6
- b) The magnetization characteristics for a 4-pole, 110V, 1000 rpm shunt generator is as follow: 7

Current (A)	0	0.5	1	1.5	2	2.5	3
O. C voltage (V)	5	50	85	102	112	126	130

The armature is lap connected with 144 conductors field resistance is 45Ω . Determine the residual flux per pole.

OR

4. a) Explain the characteristics of a separately excited generator. 6
- b) Two D. C. Shunt generators operating in parallel supply a total load current of 200A. The terminal voltage of one generator falls uniformly from 240V to 225V when delivering 120A. The terminal voltage of the second generator falls uniformly from 230V to 215V when delivering 100A. Find the load current shared by each generator and the bus-bar voltage. 7
5. a) Explain the characteristics of D. C. series motor in details. 7

- b) A 240V D. C. shunt motor runs at 800 rpm and takes armature current of 2A. Find the resistance required in series with the shunt winding so that the motor may run at 950 r.p.m. when taking an armature current of 28A. Assume flux is proportional to field current shunt field resistance is 160Ω , armature resistance is 0.4Ω . 7

OR

6. a) Explain the speed control method for D. C. shunt motor. 7
b) Explain construction and working of 3-point starter used for D. C. machine. 7
7) a) Explain Back to Back (sumpner) test on single phase transformer. 7
b) In a 50 KVA transformer, the iron loss is 500W and full load copper loss is 800W. Find the efficiency at full load and half full load at 0.8 p-f lagging. 6

OR

8. a) What is meant by Auto transformer? Explain its construction and working. 6
b) Two single phase transformer with equal voltage ratios have impedances of $(0.819 + j 2.503)\Omega$ and $(0.8 + j2.31)\Omega$ with respect to the secondary. If they operate in parallel, how they will have share a total load of 2000 kW at p.f 0.8 lagging? 7
9. a) Explain the parallel operation of three phase transformer. 7
b) A balanced 3-phase load of 30 KVA at a power factor of 0.866 lagging is connected to two transformers connected in open -- delta to give 230V three phase system find the power delivered by each transformer. 7

OR

10. a) Explain the operation of scott or T – T connection of a 3 phase transformer. 7
b) Explain delta – star and star – Delta connection of three phase transformer with their application. 7
11. a) Explain the conversion of 3 phase to 6 phase system. 7
b) Describe the inrush current phenomenon in transformer with the help of waveform. 6

OR

12. a) Describe the on load tap changing arrangements in a transformer. 6
b) Explain the construction of 3 winding transformer. 7
