B.E. Electronics Engineering (CBCS Pattern and CBS) Sem-IV
4BEEN02 / EN405 : Basic Electrical Machines

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Notes : 1. All questions carry equal marks.
2. Answer **any five** questions as per internal choice.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.
5. Use of non programmable calculator is permitted.

1. a) Derive expression for the rms value of induced voltages in the two windings of single phase transformer connected to a single phase supply. **8**

b) A 200 kVA, 1 ϕ transformer with a voltage ratio of 6350/660V has the following winding resistance **8**
$R_1 = 1.56\,\Omega, R_2 = 0.016\,\Omega$
$X_1 = 4.67\,\Omega, X_2 = 0.048\,\Omega$
Calculate the resistance and reactance of the transformer refereed to the high voltage winding.

OR

2. a) What is an auto transformer ? State its merits and demerits over the two winding transformer. **8**

b) A 3-phase, 6600/400, 50 kVA distribution transformer is connected in star delta. The transformer has per unit resistance and reactance of 0.01 and 0.05 respectively. Find the voltage regulation at full load, 0.8 power factor lagging. **8**

3. a) What are the different types of dc generators according to the ways in which fields are excited? Show the connection diagram of each type. **8**

b) A 4 pole, wave wound armature has 720 conductors and is related at 1000 rev/min. If the useful flux is 20 mwb, calculate the generated voltage. **8**

OR

4. a) What is armature reaction ? Describe the effects of armature reaction on the operation of d.c. machines how armature reaction is minimized ? **8**

b) An 8 pole lap connected armature has 40 slots with 12 conductors per slot generalized a voltage of 500 V. Determine the speed at which it is running if the flux per pole is 50 mwb. **8**

5. a) What is the necessity of starter for a d.c. motor. Explain with neat sketch, the working of a 3 point d.c. shunt motor starter, bringing out the protective features incorporated in it. **8**

b) A 250 V d.c. shunt motor on no load runs at 1000 r.p.m. and takes 5A. The total armature and shunt field resistance are respectively 0.2 Ω and 250 Ω. Calculate the speed when loaded and taking a current of 50 A, if armature reaction weaken the field by 3%. **8**

OR

6. a) Draw and explain the characteristics of d.c. series motor ? **8**

b) A 250 V d.c. shunt motor having an armature resistance of 0.25 Ω carries an armature current of 50 A and runs at 750 r.p.m. If the flux is reduced by 10% find the speed. Assume that the load torque remains the same. **8**

7. a) Explain the principle of operation of 3-phase induction motor. **8**

b) The frequency of the e.m.f. in the stator of a 4 pole induction motor is 50 Hz, and that in the rotor is 1.5 Hz. What is the slip, and at what speed the motor running. **8**

OR

8. a) Why starters are necessary for starting of induction motor, name different starting method for 3 phase induction motor. **8**

b) A 3-phase, 50 Hz, 6 pole, induction motor runs at 940 r.p.m. and delivers 7 kw output. What starting torque will the motor develop when switched directly on to the supply, if maximum torque is developed at 800 rpm ? The friction and windage losses total 840 w. **8**

9. a) Explain the different methods of excitation system of alternator. **8**

b) A 3-phase, 6 pole, star connected alternator revolves at 1000 r.p.m. The stator has 90 slots and 8 conductors per slot. The flux per pole is 0.05 Wb (sinusoidally distributed) Calculate the voltage generated by the machine if the winding factor is 0.96. **8**

OR

10. a) Why the synchronous motor not self starting ? What methods are generally used to start the synchronous motor ? **8**

b) A 125 MVA, 3 phase, star-connected 11 kV, 12 pole, 50 Hz synchronous motor has a reactance of 0.15 pu and negligible armature resistance. Calculate the synchronizing power when it supplies full load at 11 kV and 0.8 power factor leading. **8**

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