Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 08

M.Tech.(EE) (2013 Onwards) (Sem.–1)

ADVANCED ELECTRICAL MACHINES

Subject Code : MTEE-103

Paper ID : [E1366]

Time : 3 Hrs. Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1. a) Explain the armature reaction phenomena in a synchronous machine with the help of its phasor diagram in motoring and generating mode. (10)

   b) Discuss the physical significance of Park's transformation using its equations. (10)

2. a) Give the classification of synchronous machines on the basis of rotor configuration and application speed. (10)

   b) Define synchronous impedance and short circuit ratio with their physical significance. (10)

3. Discuss steady state power angle characteristics of synchronous machines having salient pole rotor and explain, the operation of synchronous machines with variable excitation and load. (20)

4. a) A 3300 V star connected synchronous motor is operating at constant terminal voltage and constant excitation. Its synchronous impedance is 0.8+j5 Ω. It operates at a power factor of 0.8 leading when drawing 800 kW from the mains. Find its power factor when the input is increased to 1400 kW, excitation remains constant. (10)

   b) Explain the operation of synchronous machines during short circuit transients and define sub-transient, transient and steady state reactances. (10)

5. a) Discuss in brief, various phasor groups and their connections for three phase transformers. (10)

   b) How a three phase transformer Yd 11 of group number 4 can be successfully operated in parallel with another transformer Dyl of group number 3? Explain. (10)

6. Explain in detail, the effects of harmonics in a three phase transformer for various connections. (20)

7. a) Explain the in-rush phenomena in three phase transformers and methods to reduce them. (5)

   b) Explain the behaviour of a three phase transformer with single phase loading under Y-Δ and Δ-Y connections. Also explain the effect of using tertiary winding. (15)

8. Write short notes on **any two** of the following : (10×2)

   a) Park's Transformation

   b) Suppression of harmonics

   c) V curves and inverted V curves