

**SUBJECT CODE :-45**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**S.E. (EEP/EE/EEE) Examination Nov/Dec 2015**  
**A.C. Machines**  
**(Revised)**

[Time: Three Hours]

[Max. Marks: 80]

“Please check whether you have got the right question paper.”

- N.B
- i) Q.No.1 and Q.No.6 are compulsory.
  - ii) Solve any two questions from Q. No. 2 to 5
  - iii) Solve any two questions from Q. No. 7 to 10
  - iv) Assume suitable data, if necessary.

**Section – A**

- Q1. Solve any five of the following 10
- a) Why the slots on the rotor of an induction motor are usually skewed?
  - b) Which induction motor is having high starting torque? Why?
  - c) The frequency of the e. m. f. in the stator of 4 pole induction motor is 50Hz, and that in rotor is 1.5Hz. What is the slip and at what speed is the motor running?
  - d) Write comparison between squirrel cage rotor and phase wound rotor.
  - e) Define the term cogging.
  - f) Stat why the single phase induction motor do not have the starting torque?
  - g) What type of motor would you use in the following application: Washing machine, sewing machine? State your reason.
  - h) Write application of Hysteresis motor.
- Q.2 a) In case of an induction motor , obtain an expression of rotor copper loss in terms of rotor input. 07
- b) A 6 pole, 50Hz, 3-ph induction motor running on full load develops a useful torque of 150Nm at a rotor frequency of 1.5Hz. calculate the shaft power output. if the mechanical torque lost in friction be 10 Nm, determine, 08
- i) Rotor copper loss.
  - ii) The input to the motor
  - iii) The efficiency
- where the total stator loss is 700 W.
- Q.3 a) Explain in detail the power flow diagram of an induction motor. 07
- b) With neat circuit diagram explain the working of Alto- Transformer starter for 3-ph induction motor. 08
- Q.4 a) Explain in detail the principle of operation of single phase inductor start induction run motor. 07
- b) Develop an equivalent circuit (circuit model) of a single – phase, single – winding Induction motor based on, 08
- Two – revolving – field theory.
- Q.5 Write short note on the following. (any 3) 15
- a) Speed control of induction motor by supply frequency control method.
  - b) AC servo motor
  - c) Hysteresis motor

d) Repulsion motor

**Section - B**

- Q.6 Solve any five of the following. 10
- a) What is pole pitch
  - b) Calculate the distribution factor of a 36 slots, 4 pole, single layer, 3-ph winding.
  - c) Enlist the different methods of excitation system of alternators.
  - d) State different methods of synchronizing the alternators.
  - e) Write any two point of difference between salient pole and smooth cylindrical rotor.
  - f) Define locked-rotor torque in synchronous motor.
  - g) What is phase-swinging in synchronous motor.
  - h) With increase in load on a synchronous motor, what is the effect on
    - i) Torque angle
    - ii) Phase angle.
- Q.7 a) With neat sketch explain the construction and working of 3-phase synchronous generators. 07
- b) A 3-phase, 50Hz, 8-pole alternator has a star-connected winding with 120 slots and 8 conductors per slots. The flux per pole is 0.05 wb, sinusoidally distributed. Determine the phase and line voltages. 08
- Q.8 a) Explain zero- power – factor method for obtaining voltage regulation in alternators 07
- b) A 3-phase, 10 KVA, 400V, 50Hz star- connected alternator supplies the rated load at 0.8 power factor lagging. If the armature resistance is  $0.5\Omega$  and synchronous reactance is  $10\Omega$ . find the torque angle and voltage regulation. 08
- Q.9 a) Explain in detail the different torques in a synchronous motor. 07
- b) The efficiency of 3-phase, 400V, star-connected synchronous motor is 95% and it takes 24A at full load & unity power factor. What will be the induced e. m. f. and total mechanical power developed at full load and 0.9 p. f. leading? The synchronous impedance per phase is  $(0.2 + j2)\Omega$  08
- Q.10 Write short note on following (any 3) 15
- a) Power angle equation
  - b) Armature reaction in synchronous generator
  - c) Stating methods of synchronous motor
  - d) Hunting and damping in synchronous motor