

V-SEM./ELECTRICAL/ 2021(W)

TH-II Energy Conversion-II

Full Marks: 80

Time- 3 Hrs

Answer any five Questions including Q No.1& 2  
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10
- a. Write the advantages of short pitch winding over full pitch winding.
  - b. What do you mean by Hunting?
  - c. Why damper bars are used in synchronous motor?
  - d. Write the maintenance schedule of power transformer.
  - e. Why centrifugal switch is used single phase induction motor?
  - f. Define pitch factor and write its value for full pitch winding.
  - g. Name the sources of Harmonics.
  - h. Write the four application of Hybrid stepper motor.
  - i. Why Synchronous motor is not self-starting?
  - j. What are the condition of synchronization 3 phase Transformer.
2. Answer **Any Six** Questions 5X6
- a. Derive the EMF equation of synchronous generator.
  - b. Explain briefly Torque- slip characteristics of 3 phase induction motor with the help of characteristics diagram.
  - c. A 4 pole,3 ph induction motor operates from a supply is 50Hz, calculate
    - (i) The speed at which the magnetic field of the stator is rotating.
    - (ii) The speed of the rotor in which slip is 0.04
    - (iii) The frequency of the rotor currents when the slip is 0.03
  - d. Explain briefly working principle and application of shaded pole induction motor with the help of diagram.
  - e. With the help of diagram explain armature reaction of an alternator and its effect at different power factor of load.

- f. Explain briefly the effect of varying excitation with constant load in synchronous motor.
- g. A synchronous motor having 40% reactance and a negligible resistance is to be operated at rated load at (i) unity p.f (ii) 0.8 p.f lag (iii) 0.8 p.f. lead. What is the value of induced e.m.f?
- 3 a. Explain briefly working principle and application of Universal motor. 5
- b. Write short note on Plugging. 5
- 4 A 3 phase induction motor having a 6 pole, star connected stator winding runs on 240V, 50 Hz supply. The rotor resistance and standstill reactance are  $0.12\Omega$  and  $0.85\Omega$  per phase. The ratio of stator to rotor turns is 1.8. Full load slip is 4%. Calculate the developed torque at full load, maximum torque and speed at maximum torque. 10
- 5 From the following test results, determine the voltage regulation of a 2000V, 1-phase alternator delivering a current of 100A at (i) unity p.f. (ii) 0.8 leading p.f. and (iii) 0.7 lagging p.f. 10  
 Test results: Full – load current of 100 A is produced on short circuit by a field excitation of 2.5A. An e.m.f of 500v is produced on open circuit by the same excitation. The armature resistance is  $0.8\Omega$ .
- 6 Write the condition for parallel operation of an alternator and explain it by using dark and bright lamp method. 10
- 7 Calculate the R.M.S value of the induced e.m.f per phase of a 10-pole, 3-phase, 50Hz alternator with 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is 150 degree. The flux per pole has a fundamental component of 0.12wb and a 20% third component. 10