5TH SEM./ ELECTRICAL/2022(W)

Th2   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.   Define distribution factor.

b.   What are the effects of armature reaction?

c.   Define hunting in a synchronous motor.

d.   Write two applications of synchronous motor.

e.   Define slip and slip speed.

f.   Write down the condition of maximum torque in 3-phase induction motor.

g.   What are the methods to change the direction of rotation of capacitor start, capacitor run motor?

h.   What are the types of stepper motor?

i.   Write down two applications of series motor.

j.   Write down two advantages of grouping of winding in 3-phase transformer.

2.   6 x 5

a.   Derive the expression of distribution factor of an alternator.

b.   Write a short note on V-curve of synchronous motor.

c.   What are the losses of an induction motor? Draw the power flow diagram of an IM.

d.   Draw and explain torque-sip characteristic of 3-phase induction motor.

e.   Explain the construction and working principle of universal motor.

f.   Briefly explain about the working principle of hybrid stepper motor.

g   What are the conditions of parallel operation of 3-phase transformer?

3   a.   A 500 volt, 50 kVA alternator having effective resistance of 0.2Ω, if an excitation current   05
of 10 A produces 200 A armature current on short circuit and an emf of 450 volts on
open circuit then calculate the value of synchronous reactance.

b.   A 4-pole, star connected alternator is rated at 15 kVA , 415 volt. The synchronous   05
reactance is 5Ω/phase. The dc voltage of 25 volt applied across the terminal causes a
current of 25 A. Calculate the voltage regulation for a load of 10 kVA at 0.8 p.f lag .

4   A slip ring IM develops a maximum torque of 4 times the full load torque at a slip of 0.2.   10
The per phase rotor resistance is 0.04Ω. The stator resistance and rotational losses are
negligible. Calculate (i) the slip at full load torque.(ii) the external resistance to be added
to obtain maximum torque at starting.

5   Explain double revolving field theory to produce starting torque of 1-phase induction   10
motor.

6   Explain the construction, working principle and torque-speed characteristic of a shaded   10
pole motor.

7   Explain the construction, working principle & running characteristic of single phase   10
series motor.