

Code: EE5T2

**III B.Tech - I Semester – Regular/Supplementary Examinations
October 2019**

**ELECTRICAL MACHINES-III
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

PART – A

Answer *all* the questions. All questions carry equal marks

11 x 2 = 22 M

1.

- a) Define pitch factor and write the formula for the same.
- b) Why the alternator is rated in kVA and not in kW?
- c) Define voltage regulation of an alternator.
- d) List the various functions of damper winding provided with alternator.
- e) Why is the e.m.f method of estimating voltage regulation is considered as pessimistic method?
- f) Why parallel operation of alternators is necessary?
- g) What is an infinite bus?
- h) List the methods of starting of 3-phase synchronous motor.
- i) What are the causes of hunting?
- j) List any four applications of a reluctance motor.
- k) Define step angle and write the expression for the same.

PART – B

Answer any *THREE* questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. a) Formulate the e.m.f equation of an alternator. 8 M

b) The phase e.m.f. of a 3-phase alternator consists of fundamental, 20% 3rd harmonic and 10% 5th harmonic. The amplitude of fundamental is 1000V. Find the r.m.s value of line and phase voltage, when alternator is connected in (i) star and (ii) delta. 8 M

3. A 3-phase star connected, 1000 kVA, 2000V, 50 Hz alternator gave the following open circuit and short circuit readings

Field current in Amps	10	20	25	30	40	50
OC voltage in Volts	800	1500	1760	2000	2350	2600
SC current in Amps	-	200	250	300	-	-

Draw the characteristic curves and compute the full load percentage voltage regulation using m.m.f method at

(i) 0.8 p.f lagging and (ii) 0.8 p.f leading.

The armature effective resistance per phase is taken as 0.2Ω

16 M

4. a) An alternator is connected to infinite bus and is running at no-load. Explain briefly how to increase its real and reactive power outputs. 8 M

- b) Two AC generators running in parallel supply a lighting load of 2000 kW and a motor load of 4000 kW at 0.8 p.f lagging. One machine is loaded at 2400 kW and at 0.95 p.f lagging. Find the output and power factor of the second machine? 8 M
5. a) A 3-phase synchronous motor absorbing 60kW is connected in parallel with a factory load of 240kW having a lagging power factor of 0.8. If the combined load has a p.f of 0.9, find the leading kVAR supplied by the motor and the corresponding p.f. 8 M
- b) Explain the significance of V and inverted V curves of a synchronous motor. 8 M
6. a) How the stepper motors differ from other motors? List the applications of stepper motors. 8 M
- b) Explain the principle of operation and applications of reluctance motor. 8 M