

TED (15) – 6033

Reg. No.....

(REVISION — 2015)

Signature .....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/  
MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2019

**SYNCHRONOUS MACHINES AND FHP MOTORS**

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Write the EMF equation of an alternator considering winding factor.
2. List the methods to find regulation of alternator.
3. Define a synchronous condenser.
4. What is synchronous impedance ?
5. List the applications of FHP motors.

(5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Draw the phasor diagram of an alternator under load condition at lag and upf condition.
2. Differentiate salient pole rotor and non salient pole rotor.
3. Describe open circuit and short circuit tests of an alternator.
4. Explain the method of calculating voltage regulation by EMF method.
5. Describe the principle of operation of synchronous motors.
6. Give the applications of synchronous motor.
7. Explain the working of Universal motors.

(5×6 = 30)

## PART — C

Marks

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

## UNIT — I

- III (a) Derive EMF equation of an alternator. 7
- (b) A 3-phase, 8-pole, 760 rpm star-connected alternator has 72 slots on the armature. Each slot has 12 conductors and winding is short chorded by 2 slots. Find the induced emf between lines, given the flux per pole is 0.06 Wb. 8

OR

- IV (a) Describe the effect of armature reaction in alternators. 9
- (b) A 3 phase 16 pole alternator has star connected winding with 144 slots and 10 conductor per slot. The flux per pole is 0.03 Wb, sinusoidally distributed and the speed is 375 rpm. Find the frequency, phase and line EMF. Assume full pitched winding 6

## UNIT — II

- V (a) Describe the method of calculating voltage regulation by Zero power factor method. 8
- (b) A three phase star connected 1000 kVA, 11 kV alternator has rated current of 52.5 A. The AC resistance of the winding per phase is  $0.45\Omega$ . The test results are  
 OC TEST :  $I_f = 12.5$  A,  $V_L = 422$  V  
 SC TEST :  $I_f = 12.5$  A,  $I_L = 52.5$  A  
 Determine full load voltage regulation of the alternator at 0.8 pf lagging. 7

OR

- VI (a) Describe the method of calculating voltage regulation by Ampere turn method. 8
- (b) In 50 kVA, star connected, 440 V, 3 phase alternator, the effective armature resistance is  $0.25\Omega$  per phase. The synchronous reactance is  $3.2\Omega$  per phase and the leakage reactance is 0.5 per phase. Determine percentage regulation on full load upf. 7

## UNIT — III

- VII (a) Describe the starting methods of synchronous motor. 7
- (b) Explain different torques of a synchronous motor. 8

OR

- VIII (a) Describe classification of single phase induction motor. 8
- (b) Describe V curves of synchronous motor. 7

## UNIT — IV

- IX (a) Explain working of stepper motors with the help of neat sketch. 7
- (b) Describe working of switched reluctance motors. 8

OR

- X (a) Describe working of servo motors. 7
- (b) Explain working of shaded pole motors with the help of neat sketch. 8