

Day: Saturday
Date: 17/11/2018

W-2018-2856

Time: 10.00 AM TO 01.00 PM
Max Marks: 80

N.B:

- 1) **Q.No.1 and Q.No.5 are COMPULSORY.** Out of the remaining questions attempt **ANY TWO** questions from each section.
 - 2) Answers to both the sections should be written in **SEPARATE** answer books.
 - 3) Figures to the right indicate **FULL** marks.
-

SECTION – I

Q.1 a) A 3 phase, 16 pole, alternator has star connected full pitched winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 wb and speed is 375 rpm. Calculate induced emf. **[06]**

b) Draw 'V' curve and 'inverted V' curve for synchronous motor. **[04]**

c) Compare three phase synchronous motor with three phase induction motor. **[04]**

Q.2 a) What is armature reaction and explain its effect at zero pf lag with neat waveforms. Draw vector diagram at 0.8 power factor lag. **[05]**

b) A three phase star connected alternator operated for OC and SC test. The alternator is rated as 1000 kVA, 2000V, 50Hz with armature resistance of 0.3 Ω per phase. **[08]**

If (A)	10	20	25	30	40	50
Open circuit voltage (V)	800	1500	1700	2000	2350	2600
SC current A	---	200	250	300	---	---

Calculate voltage regulation of alternator 0.8 pf lag. Use mmf method.

Q.3 a) Draw and explain phasor diagram of salient pole alternator at 0.8 pf lag. **[05]**

b) Draw neat circuit diagram to determine X_d and X_q using slip test. Describe stepwise procedure to perform the test and to calculate X_d and X_q . **[08]**

Q.4 a) Explain operation of synchronous motor at constant excitation and variable load condition. **[05]**

b) A three phase star connected 6.6 kV synchronous motor takes 72 amp at 0.8 pf leading. The armature resistance and reactance of the motor are 0.1 Ω and 0.9 Ω respectively. Determine induced emf and total power input. **[08]**

P.T.O.

SECTION – II

- Q.5** a) Describe procedure for synchronization of alternator with neat diagram. [05]
- b) Define specific electric loading. What are the factors that affect the choice of specific electric loading? [04]
- c) Describe construction and principle of operation of Hysteresis motor. State its applications. [05]
- Q.6** a) A lighting load of 600kw and motor load of 707 kw at 0.707 p.f. are supplied by two alternators running in parallel. One of the machines supplies 900kw at 0.9pf lagging. Find the load and p.f. of the second machine. [06]
- b) Show that for alternators running in parallel, the division of load between them is governed mainly by speed load characteristics of their prime movers. [07]
- Q.7** a) Calculate main dimensions of water wheeled generator with following specifications: [06]
3000kVA, 6600V, 3phase, 50Hz, 187.5 rpm, star connected, 0.8 power factor lagging. Assume suitable values of specific magnetic loading and specific electric loading. Also find peripheral speed.
- b) What is effect of air gap on design and performance of synchronous machine? [07]
What is the significance of $\frac{L}{\tau}$ ratio?
- Q.8** a) A 1 kw, universal motor has impedance of $(1 + j5)$ ohm and runs at 1000 rpm with a current of 0.8 A on 230 V dc. Find its speed when it runs on 230 V ac at same current. [06]
- b) Explain principle of operation of brushless dc motor. State its advantages over synchronous motor. [07]

* * * *