

1108

B.E., (Electrical and Electronics Engineering)

Fourth Semester

EE-401: Electric Machinery – II

(May – 2017)

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part. Missing data (if any) can be appropriately assumed.

x-x-x

Q1.

- a) Derive the expression for flux generated due to armature reaction in terms of maximum flux. (2)
- b) Draw the proper circuit arrangement for conducting the open-circuit test on a 3-phase synchronous machine. (2)
- c) Draw the V and inverted V curves for synchronous machine at full and half load. (2)
- d) How to remove the effect of hunting in synchronous machine. (2)
- e) Draw the power angle characteristics of salient and non-salient pole synchronous machine. (2)

PART-A

- Q2. A 3-phase, star-connected round rotor synchronous generator rated at 10 kVA, 230 V has an armature resistance of 0.5 ohms per phase and a synchronous reactance of 1.2 ohms per phase. Calculate the percentage voltage regulation at full load at power factors of
- a) 0.8 lagging.
  - b) 0.8 leading.
  - c) determine the power factor such that the voltage regulation is zero at full load. (3, 3, 4)
- Q3. a) Analyze the salient pole synchronous machine with the help of proper phasor diagram at 0.8 lagging power factor load. Also, find out internal power factor angle. (4,2)
- b) A 1500 KVA star-connected, 2300 V, 3-phase salient pole synchronous generator has reactances  $X_d=1.95$  ohms and  $X_q=1.4$  ohms per phase. All losses may be neglected. Find the excitation voltage for the operation at rated KVA and power factor of 0.85 lagging. (4)
- Q4. Explain the constructional diagram and working of a single phase synchronous generator and with the help of proper phasor diagram. (3, 7)

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**PART-B**

- Q5. a) Explain the effect of change in speed on load sharing of two alternators in parallel. (5, 5)  
b) Develop the speed and torque expressions for a brushless DC (BLDC) motor. (3,7)
- Q6. Write the conditions for synchronization of 2 alternators working in parallel. And explain all dark lamp method used for synchronization. (5,5)
- Q7. Write short notes on any two  
a. Linear induction motor  
b. Hysteresis motor.  
c. Reluctancel motor. (5,5)

x-x-x