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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (EE) PT (2012 Onwards) (Sem.-5)

SYNCHRONOUS MACHINES

Subject Code : BTEE-501

M.Code : 70554

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**Answer briefly :**

1. Differentiate salient pole and cylindrical rotor synchronous generators.
2. Why fractional pitch winding is preferred over full-pitch winding?
3. Explain the role of damper windings in synchronous generator.
4. Explain armature reaction of a synchronous machine.
5. Why is the short circuit characteristics of an alternator is linear?
6. Why are synchronous motors not self-starting?
7. What is the effect of increase in excitation of a synchronous motor?
8. How hunting can be reduced in alternators?
9. Why are alternators operated in parallel?
10. Explain infinite bus-bars.



SECTION-B

11. Derive the expression for (i) pitch factor and (ii) distribution factor.
12. Draw and explain the phasor diagram of a loaded alternator for loads at lagging power factor.
13. Explain the Potier triangle method of finding regulation of an alternator.
14. Draw and explain the equivalent circuit of a synchronous motor.
15. Derive the condition for maximum power output of a synchronous generator connected to infinite bus-bar and operating at constant excitation.

SECTION-C

16. Calculate the rms value of the induced emf per phase of a 10-pole, 3-phase, 50 Hz alternator with 2 slots per pole per phase and 4 conductors per slot in two layers. The coil span is 150° . The flux per pole has a fundamental component of 0.12 Wb and 15% third harmonic component.
17. A 3-phase, star-connected, 1000 kVA, 11 kV alternator has rated current of 52.5 A. The ac resistance of the winding per phase is 0.45Ω . The test results are given below:
OC Test: Field current = 12.5 A, Voltage between lines = 422 V
SC Test: Field current = 12.5 A, Line current = 52.5 A
Determine the full load voltage regulation of the alternator (i) 0.8 pf lagging and (ii) 0.8 pf leading.
18. A 3-phase, 415 V, 6-pole, 50 Hz, star-connected synchronous motor has emf of 520 V (L-L). The stator winding reactance of 2Ω per phase, and the motor develops a torque of 220 Nm. The motor is operating at 415 V, 50 Hz bus.
 - a) Calculate the current drawn from the supply and its power factor.
 - b) Draw the phasor diagram showing all the relevant quantities.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.