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	B.Tech. (EE) PT (2012 Onwards)	(Sem.–5)
SYNCHRONOUS MACHINES		
Subject Code : BTEE-501		
M.Code:70554		
Time	e : 3 Hrs.	Max. Marks:60
INSTRUCTION TO CANDIDATES :		
1.	SECTION-A is COMPULSORY consisting of TEN que each.	stions carrying TWO marks
2.	SECTION-B contains FIVE questions carrying FIVE have to attempt any FOUR questions.	marks each and students
3.	SECTION-C contains THREE questions carrying TEI have to attempt any TWO questions.	N marks each and students

SECTION-A

Answer briefly :

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Total No. of Questions: 18

- 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.



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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 Poteir 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 0.45 Ω. 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 2 Ω 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.

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