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SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

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Total number of pages: [2]

Total number of questions: 06

**B.TECH. / EE/ 5<sup>th</sup> Sem**  
**SYNCHRONOUS MACHINES**

**Subject Code: BTEE-501**

**Paper ID:**

**Time allowed: 3 Hrs**

**Max Marks: 60**

**Important Instructions:**

- All questions are compulsory.
- Assume any missing data.

**PART A (2×10)**

**All COs**

**Q.1. Short-Answer Questions:**

- What is meant by infinite busbar?
- Define synchronizing power coefficient.
- Why are alternators rated in KVA and not in KW?
- Explain the concept of transient stability in alternators.
- Why synchronous motor is designed as p.f. improving device?
- Differentiate between synchronous and asynchronous torque.
- Define short circuit ratio.
- Compute synchronous speed of 4 pole alternator having frequency of 60 Hz.
- Draw the V curve for a 3-phase synchronous machine.
- What is meant by synchronous impedance in alternators?

**PART B (8×5)**

**Q.2. What is voltage regulation? Mention the methods to calculate the voltage regulation.**  
**Explain any two methods in details with neat diagrams.**

**CO3**

**OR**

Explain two reaction theory of salient pole machines. Also discuss effects of variation of power factor on voltage.

- Q. 3. Explain the operating principle & construction of Reluctance motor and Hysteresis motor with neat sketches. CO2

OR

Enumerate hunting phenomena in synchronous machines. What are its causes and how it can be reduced?

- Q. 4. A 3 phase, 16 pole, star connected alternator has 114 slots on the armature periphery, each slot containing 10 conductors, is driven at 375 r.p.m. The line value of e.m.f. available across the terminals is observed to be 2.657kV. Find the frequency of induced e.m.f. and flux per pole. CO2

OR

Two alternators A and B operate in parallel and supply a load of 10 MW at 0.8 p.f. lagging. By adjusting steam supply of alternator A its power output is adjusted to 6000 KW and by changing its excitation its p.f. is adjusted to 0.92 lagging. Find the p.f. of alternator B and its KVA.

- Q. 5. Derive an expression for the voltage induced in an alternator and significance of different factors which appears in the expression. CO3

OR

What is SCR? How size of synchronous machine is related with SCR? Explain the method to determine SCR of a synchronous machine using its OCC and SCC.

- Q. 6. Write short notes on the following:

- (a) Starting methods for a synchronous motor
- (b) Synchronous Condenser.

CO1

OR

- (a) Synchronous Machine Reactances and their determination
- (b) Effect of unequal voltages on parallel operation of alternators.