

2056
B.E. (Electrical and Electronics Engineering)
Fourth Semester
PC-EE-401: Electrical Machine - II

Time allowed: 3 Hours

Max. Marks: 50

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

x-x-x

Q1. Explain in brief.

- A) What is the equation of the induced emf in an alternator? (01)
- B) Draw labelled space-time phasor diagram for the synchronous motor operating in lagging power factor when motor rotates in anticlockwise direction. (02)
- C) What do you mean by hunting? (01)
- D) Draw transient current waveform during short circuit on the armature terminals of unloaded synchronous alternator. (01)
- E) Why alternators operating in parallel must have the load-speed drooping characteristics? (02)
- F) Write two applications each for linear induction motor and hysteresis motor. (02)
- G) How a synchronous motor operates as synchronous condenser? (01)

Part A

- Q2.A) A 3-phase star connected alternator is rated at 1500kVA, 11kV. The armature effective resistance and synchronous reactance are 1.2Ω and 24Ω respectively per phase. Calculate the percentage regulation for a load of 1200kW at power factors of (i) 0.8 lagging, (ii) unity and (iii) 0.8 leading. (05)
- B) Why we perform the open circuit and short circuit tests on the synchronous machine? Draw the practical setup to perform the open circuit test. Also draw the Open circuit and short circuit characteristics. (05)
- Q3. A) With a phasor diagram explain the concept of two reaction theory in salient pole alternator. (05)
- B) With a neat circuit diagram, explain slip test to determine direct axis and quadrature axis reactances of a salient pole synchronous generator. (05)
- Q4.A) Define armature reaction and explain the effect of armature reaction on different power factor loads of synchronous generators. (05)
- B) Draw and explain the V and inverted V characteristics of the synchronous machine operating as motor at no load, half load and full load in detail with the help of suitable phasor diagram. (05)

Part B

- Q5. A) Explain the one dark and two bright lamp method used for synchronizing two three phase alternator in parallel. Also write the advantages of this method as compared to all dark lamp method. (05)
- B) Derive the power equation for the cylindrical rotor synchronous machine in terms of Synchronous reactance X_s and load angle δ when armature resistance is neglected. (05)
- Q6. With a neat schematic diagram, explain the construction and operation of BLDC motor. List out Advantages and Disadvantages. (10)
- Q7. A) With a neat sketch, explain the various characteristics of repulsion motor. (05)
- B) With necessary waveforms, explain the operation of hysteresis motor. (05)

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