2014
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) Define the term over-excitation and under-excitation with reference to synchronous machines.   (02)
B) Explain why the SCC is linear.   (02)
C) What is a damper winding? What is the function of it and where it is located? (02)
D) Discuss the use of synchroscope in the parallel operation of three-phase alternators. (02)
E) How a synchronous motor can be used as a synchronous condenser?   (02)

Part A

Q2. A) A three-phase, 3300 V, 50 Hz, star-connected alternator has an effective resistance of 0.5 Ω/phase. A field current of 30 A produces full-load current of 180 A on short-circuit and a line to line emf of 1000 V on open circuit. Determine
(i) the power angle of the alternator when it delivers full-load at 0.8 pf (lag)
(ii) the SCR of the alternator.   (05)

B) Define voltage regulation of an alternator. Explain MMF method of determining regulation of alternator.   (05)

Q3. A) A 500V, 6-pole, 3-phase, 50 Hz, star-connected synchronous motor has a resistance and synchronous reactance of 0.3Ω and 3Ω per phase, respectively. The open-circuit voltage is 600 V. If the friction and core losses total 1 kW, calculate the line current and power factor when the motor output is 100 hp.   (05)

B) Draw neat and clean labeled phasor diagrams for the synchronous machines (cylindrical and salient pole) operating at lagging power factor as an alternator.   (05)

Q4. A) Draw the circuit model of alternator during steady state, transient and sub-transient states. Discuss how the reactances during these states affect the machine performance. (05)

B) Explain why hunting is objectionable. What are the various causes of hunting? How can it be reduced?   (05)

Part B

Q5. A) Why there is need of parallel operation in power system? Is it making any difference if two different types of alternators connected together at point of common coupling? Support your answer with suitable explanation.   (05)

B) The governors of the two 50 MVA, three-phase alternators operating in parallel. are set in such a way that the rise in speed from full-load to no-load is 2% in one machine and 3% in the other. The characteristics being straight lines in both cases. If each machine is fully loaded when the total load is 100 MW (unity pf), what will be the load on each machine when load is reduced to 75 MW.   (05)

Q6. A) Explain the operation of special machine brushless DC motor in detail along with the special features of its construction and characteristic. Why it is named as brushless DC motor. (05)

B) Explain universal motor in detail. Write two practical applications of the motor. (05)

Q7. A) Write short notes on Reluctance motor.   (05)

B) Drooping characteristics of the alternators.   (05)

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