Code :RR310205

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III B.Tech I Semester(RR) Supplementary Examinations, May 2011
ELECTRO-MECHANICS-III
(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks
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1. (a) Derive the expression for distribution factor and Calculate the distribution factor for a 36-slots,4-pole,single-layer three-phase winding.
   (b) Determine the pitch (or coil span) factors for the following windings:
      i. 36 stator slots, 4-pole, coil span 1to 8
      ii. 96 stator slots, 6poles, coil span 1to 12.

2. (a) Draw the equivalent circuit and phasor diagrams of a synchronous generator.
   (b) A 3-phase, 50Hz, 2-pole, star connected turbo alternator has 54 slots with 4 conductors per slot. The pitch of the coils is 2 slots less than the pole pitch. If the machine gives 3300V between lines on open circuit with sinusoidal flux distribution, determine the useful flux per pole.

3. (a) What are the merits and limitations of M.M.F Method.
   (b) A 100KVA, 3000V, 50Hz, 3-phase star-connected alternator has an armature effective resistance of 0.2Ω.A field current of 40A produces on short circuit current of 200A and an open-circuit e.m.f. of 1040V(line value). Calculate the full-load percentage regulation at a power factor of 0.8 lagging. How will the regulation be affected if the alternator delivers its full-load output at a power factor of 0.8 leading?

4. (a) Explain different synchronization methods used for synchronizing alternators.
   (b) A 3 MVA,6-pole alternator runs at 1000 r.p.m in parallel with other machines on 3.3 KV bus-bars. The synchronous reactance is 20%.Calculate the synchronizing power per one mechanical degree of displacement and the corresponding synchronizing torque when the alternator is supplying full load at 0.8 p.f lag.

5. (a) What are the advantages of smaller units in parallel than single larger units
   (b) Two station generators A and B operate in parallel. Station capacity of A is 50 MW and that of B is 25 MW.Full-load speed regulation of station A is 3% and full-load speed regulation of B is 3.5%. Calculate the load sharing if the connected load is 50 MW, no-load frequency is 50 HZ.

6. Write short notes on the following
   (a) V and Λ curves of synchronous motor.
   (b) Synchronous condenser for Power factor improvement.

7. (a) What could be the reasons if a synchronous motor fails to start?
   (b) The synchronous reactance per phase of a 3-phase star connected 6600V synchronous motor is 10Ω. For a certain load, the input is 900KW and the induced line emf is 8900V(line value). Evaluate the line current. Neglect resistance.

8. Write short notes on following:
   (a) Double revolving field theory.
   (b) Capacitor Start single phase induction motor.

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