Code No: 07A50203 **R07** **Set No. 2**

III B.Tech I Semester Examinations,May 2011
ELECTRICAL MACHINES-III
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. What are the effects of hunting on the performance of synchronous motor and explain the method of suppressing the hunting. [16]
2. Explain the operation of a single phase induction motor using split phase technique. [16]
3. (a) Why is a rotating field system used in preference to a stationary field? A 6-pole alternator rotates at 1000 rpm. What is the frequency of the generated voltage?
   (b) List difference between salient type and non salient type of rotor construction. [8+8]
4. Derive an expression for power developed in a non salient pole alternator. [16]
5. Explain the phenomena of armature reaction when an alternator is delivering a load current at
   (a) purely lagging p.f.
   (b) unity p.f.
   (c) purely leading p.f. [16]
6. From the following test results, determine the voltage regulation of a 2000V, single phase alternator delivering a current of 100A at:
   (a) unity p.f.
   (b) 0.8 leading p.f.
   (c) 0.71 lagging p.f.

   Test results:

   Full load current of 100A is produced on short circuit by a field excitation of 2.5A, an emf of 500V is produced on open circuit by the same excitation. The armature resistance is 0.8 ohms. [16]
7. Explain the principle of operation of a universal motor along with neat Diagram. [16]
8. (a) Derive necessary equations for power developed in a synchronous motor.

(b) A 2300 volts three phase star connected synchronous motor has synchronous impedance of (0.2+j 2.2) ohms per phase. The motor is operating at 0.7 power factor leading with line current of 200 amperes. Determine back emf per phase. [8+8]

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Code No: 07A50203 **R07** **Set No. 4**

III B.Tech I Semester Examinations,May 2011
ELECTRICAL MACHINES-III
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Show that the self starting torque of a single phase induction motor is zero. [16]
2. Explain two important functions served by damper windings in a synchronous motor. State application of a synchronous motor [16]
3. Explain how the induced emf in armature winding is affected by:
   (a) Form factor
   (b) Pitch factor
   (c) Distribution factor. [16]
4. (a) Explain different torques of a synchronous motor.
   (b) The input to a 11000 volts three phase star connected synchronous motor is 60 amperes. The effective resistance and synchronous reactance per phase are 1 ohm and 30 ohms respectively. Find the induced emf for a power factor of 0.8 leading. [8+8]
5. The effective resistance of a 1200 KVA, 3.3KV, 50Hz, 3 phase star connected alternator is 0.25Ω/phase. A field current of 35A produces a current of 200A on short circuit and 1.1KV (line to line) on open circuit. Calculate the power angle and p.u. change in magnitude of the terminal voltage when the full load of 1200KVA at 0.8 p.f. (lag) is thrown off. Draw the corresponding phasor diagram. [16]
6. (a) State the conditions necessary for paralleling alternators?
   (b) A 500 MVA, 3 phase, 6 pole, and 11 KV star connected alternator is running in parallel with other synchronous machine on 11000 V bus. The synchronous reactance of the machine is 5 Ω per phase. Calculate the synchronizing power per mechanical degree at full load and 0.8 p.f. lagging. [8+8]
7. Explain the principle of operation of permanent magnet motor. [16]
8. Draw the phasor diagram of a loaded alternator for the following conditions:
   (a) lagging p.f.
   (b) leading p.f.
   (c) unity p.f. [16]

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Code No: 07A50203 **R07** **Set No. 1**

III B.Tech I Semester Examinations,May 2011
ELECTRICAL MACHINES-III
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the principle of operation of permanent magnet motor. [16]
2. Discuss with circuit diagram any one of method of starting. [16]
3. Explain the effect of armature reaction on the performance of an alternator. How it depends on the load p.f.? Explain with suitable diagrams. [16]
4. What do you mean by synchronizing alternators? Describe any one method of synchronizing? [16]
5. A 3 phase, 4 pole, star connected turbo alternator has a cylindrical rotor. The reactance per phase of winding is 2.5Ω and resistance per phase is 0.15 Ω. The alternator has a terminal potential difference of 6600 V when delivering a current of 250A. Calculate
   (a) The generated emf at 0.6 p.f lagging
   (b) The regulation at 0.8 p.f lagging. [16]
6. Explain two field revolving theory for single phase induction motor and give its Torque slip characteristic. [16]
7. (a) Derive the commonly used expression for power developed by synchronous motor.
   (b) The input to a 11000 volts three phase star connected synchronous motor is 60 amperes. The effective resistance and synchronous reactance per phase are 1 ohm and 30 ohms respectively. Find the power supplied to the motor.[8+8]
8. A 3 phase, 10 pole star connected alternator runs at 600 rpm. It has 120 slots with 8 conductors per slot and conductors of each phase are connected in series. Determine the phase and line electromotive forces if the flux per pole is 56 mWb.What harmonics due to slots might occure in the phase and line voltages. [16]

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Code No: 07A50203 **R07** **Set No. 3**

III B.Tech I Semester Examinations,May 2011
ELECTRICAL MACHINES-III
Electrical And Electronics Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. A 6.6 KV, 1 MVA, 3 phase alternator delivering full load at 0.8 p.f. lagging. Its reactance is 20% and resistance negligible. By changing the excitation, the EMF is increased by 25% at this load. Calculate the new current and power factor. The machine is connected to infinite bus bars. [16]

2. Explain the following:
   (a) Though the distributed windings gives reduced emfs as compared to concentrated winding, yet it is most commonly employed. Why?
   (b) What is meant by winding factor?
   (c) What is meant by pitch factor and distribution factor? [16]

3. Explain the effects of varying excitation on armature current and power factor in a synchronous motor. Draw "V" curves. [16]

4. The phase emf of a 3 phase, 50 Hz alternator consists of a fundamental, a 20% 3rd harmonic and a 10% 5^{th} harmonic. The amplitude of the fundamental voltage is 1000V. Calculate the rms line voltage when the alternators windings are in star and delta. If the reactance per phase at 50 Hz is 12Ω calculate the circulating current when the machine is delta connected. [16]

5. Using double field revolving field theory explain the torque slip characteristic of of a single phase induction motor and prove that it can not produce starting torque. [16]

6. Draw the excitation circle for a synchronous motor. How is it derived? [16]

7. The following test results are obtained from a 3 phase, 6000 KVA, 6600V, star connected, 2 pole, 50 Hz turbo alternator: With a field current of 125A, the open circuit voltage is 8000V at the rated speed; with the same field current and rated speed the short circuit current is 800A. At the rated full load, the resistance drop is 3%. Find the regulation of alternator on full load and at a p.f. of 0.8 lagging. [16]

8. Explain the construction and principle of operation of universal motor and mention its applications. [16]

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