B.Tech. ELECTRICAL ENGINEERING (BTELVI)

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Term-End Examination

December, 2013

BIEE-011 : ELECTRICAL MACHINES - II

Time : 3 hours   *Maximum Marks : 70*

Note :   *Attempt **any seven** questions. All questions carry **equal** marks.*

1.   Define form factor, chording factor and breadth   **10**
      factor. Also derive emf equation of an alternator.

2.   Define the terms synchronous reactance and   **10**
      voltage regulation of an alternator. Explain
      synchronous impedance method of determining
      regulation of an alternator.

3.   A 500V, 50kVA single phase alternator has an   **10**
      effective resistance of 0.2Ω. A field current of 10A
      produces an armature current of 200A on short
      circuit and an emf of 450V on open circuit.
      Calculate the full load regulation.

4.   What is the nature of power factor in a power   **10**
      system ? Explain how a synchronous motor can
      be used for power factor improvement, with
      proper vector diagram.

5. 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 to line). Evaluate the line current. Neglect resistance. **10**

6. Show that the magnetic field produced in the air gap of a 3-phase induction motor is of rotating nature. Give the expression of this speed in term of poles and frequency of supply. **10**

7. A 6 pole, 3-phase, 50Hz induction motor develops maximum torque of 20 kgm at a speed of 970 rpm. Determine the torque exerted by the motor at 4% slip. The rotor resistance per phase is 0.5Ω. **10**

8. Explain how the speed of slip, ring induction motor can be changed by changing the rotor circuit resistance. What are the limitations and disadvantages of this method ? **10**

9. The rotor of a 6 pole, 50Hz slip ring induction motor has a resistance of 0.2 ohm per phase and runs at 960rmp on full load. Calculate the approximate resistance per phase of a rotor rheostat such that speed is reduced to 800rpm for full load torque. **10**

10. For small and sensitive servo-mechanism give four reasons why ac servomotors are generally preferred to dc servomotors ? Briefly explain the principle of operation of two-phase servomotor. **10**

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