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Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2011

ME/AM 04 306—ELECTRICAL TECHNOLOGY

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

1. (a) Explain how slip-frequency currents are set up in the rotor of a three-phase induction motor.

   (b) Explain the star-delta starting method of a 3-phase induction motor.

   (c) Derive the equivalent torque of an electric drive, driving linear and rotational motion.

   (d) Write down the different components of load torque.

   (e) Explain the input-output characteristics of AC to DC converter.

   (f) Describe the stator voltage control of 3-phase induction motor.

   (g) A 3-phase, star connected synchronous generator, driven at 900 r.p.m. generates 440 V at 50 Hz on open circuit. The stator has 2 slots/pole/phase and 4 conductors per slot. Calculate the useful flux per pole.

   (h) Write short notes on servo motors.

(8 × 5 = 40 marks)

2. (a) The power input to a 500 V, 50 Hz, 6 pole, 3-phase induction motor running at 975 r.p.m. is 40 kW. The stator losses are 1 kW and the friction and windage losses total 2 kW. Calculate the slip, rotor copper loss and the frequency.

Or

   (b) Explain the torque-slip characteristics of a 3-phase induction motor. Draw the characteristics for different rotor resistance.

3. (a) Explain the four quadrants operation of a drive with an example.

Or

   (b) Explain the steady-state stability of a drive. Derive the condition of stable operation of the drive.

4. (a) Explain the principle of PWM inverter and give its applications.

Or

   (b) Explain the voltage-frequency speed control of the induction motor drives.

5. (a) Derive the expression for the induced e.m.f. in a 'm' phase synchronous generator. (Assume full pitch winding).

Or

   (b) A 3-phase, star-connected alternator is rated at 1600 kVA, 13.5 kV. The effective armature resistance and synchronous reactance are 1.5 Ω and 30 Ω respectively per phase. Calculate the full-load regulation at 0.8 power factor lagging.

(4 × 15 = 60 marks)