D 51478 (Pages 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2008

ME/AM 04 306—ELECTRICAL TECHNOLOGY

(2004 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

I. (a) A 3 phase 50 Hz 4 pole induction motor has a slip of 4%. Calculate (i) speed of the motor ; (ii) frequency of rotor emf.

(b) Explain no load test in an induction motor.

(c) Why switching circuits are necessary in electric drives ? Explain.

(d) What are active and passive loads ? Explain.

(e) Compare BJT with MOSFET.

(f) Explain briefly the principle of PWM inverters.

(g) What is meant by regulation of an alternator ? How will you obtain regulation ?

(h) A 3 phase 16 pole alternator has a star connected winding with 144 slots and 10 conductors per slot. The flux per pole is 0.03 Wb, sinusoidally distributed and speed is 375 rpm. Find the frequency, phase and line emf. Assume full pitched coil.

(8 × 5 = 40 marks)

II. (a) A 50 Hz 8 pole induction motor has a full load slip of 4%. The rotor resistance/ph = 0.01 Ω and stand still reactance/ph = 0.1 Ω. Find the ratio of maximum to full load torque and the speed at which the maximum torque occurs.

(7 marks)

(b) Why does the rotor rotates by giving supply to stator of a 3 phase induction motor.(8 marks)

Or

(a) Explain the equivalent circuit of an induction motor. (10 marks)

(b) What are the advantages of induction motor ? (5 marks)

III. (a) A motor drives 2 loads. One has rotational motion. It is coupled to the motor through a reduction gear with $a = 0.1$ and efficiency 90%. The load has a moment of inertia of 10 kgm and a torque of 10 Nm other load has translational motion and consists of 1000 kg. Weight to be lifted up at a uniform speed of 2 m/s. Coupling between this load and motor has an efficiency of 90%. Motor has a moment of inertia 0.25 kgm^2 and runs at a constant speed of 1440 rpm. Determine equivalent inertia referred to motor shaft and power developed by motor.

(15 marks)

Or

Turn over

(b) Explain in detail different parts of an electric derive. (15 marks)

IV. (a) Give a detailed description about (i) frequency control ; (ii) voltage and frequency control in a 3 phase induction motor drive.

(15 marks)

Or

(b) Give a brief description about BJT, MOSFET and IGBT. Explain their control characteristics.

(15 marks)

V. (a) The effective resistance of a 1200 kVA, 3.3 kV, 50 Hz 3 phase star connected alternator is 0.25 Ω/ph. A field current of 35 A produces a current of 200 A on short circuit and 1.1 kV 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 1200 kVA at 0.8 pf lag is thrown off. Draw the corresponding phasor diagram.

(10 marks)

(b) What are the applications of synchronous motor. (5 marks)

Or

(a) Explain any one method of starting of synchronous motor. (9 marks)

(b) Derive the emf equation of an alternator. (6 marks)

[4 × 15 = 60 marks]