D 51484 (Pages 2) Name.....

Reg. No.....

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

EC/AI 04 304—ELECTRICAL ENGINEERING

(2004 Admissions)

Time : Three Hours Maximum : 100 Marks

Answer **all** *questions.*

I. (a) Distinguish between self-excited and separately excited d.c. generators. How are self excited generators classified ?

(b) Sketch the speed-torque characteristic of a dc (a) shunt motor ; (b) series motor. Account for the shape of the above characteristic curves.

(c) What are the applications of autotransformers ?

(d) Explain how copper loss is calculated at different load fractions from SC test.

(e) Define voltage regulation of an alternator. Explain the various factors which may affect the regulation of an alternator.

(f) What is meant by slip in an induction motor ? Why must slip be present for motor action ?

(g) What is meant by (i) an indicating type instrument ; (ii) an integrating type instrument ? Give at least *one* example each.

(h) Write short notes on eddy current damping.

($8 \times 5 = 40$ marks)

II. (a) (i) Derive the emf equation of a dc generator.

(ii) The armature resistance of a 200V shunt motor is 0.4 Ω and noload current is 2A. When loaded and taking an armature current of 50A, the speed is 1200 RPM. Find approximately the noload speed.

(15 marks)

Or

(b) A 4-pole, 250 V, wave-connected shunt motor gives 10 kW when running at 1000 rpm and drawing armature and field currents of 60 A and 1 A respectively. It has 560 conductors. Its armature resistance is 0.2 Ω. Assuming a drop of 1V per brush, determine : (a) total torque ; (b) useful torque ; (c) useful flux per pole ; (d) rotational losses ; (e) efficiency.

(15 marks)

Turn over

III. (a) Discuss how the equivalent circuit of a transformer can be obtained from different tests. (15 marks)

Or

(b) A transformer takes 10 A on no load at a power factor of 0.1. The turns ratio is 4 : 1. If a load is supplied by the secondary at 200 A, and a p.f. of 0.8, find the primary current and pf (internal voltage drops in transformer are to to be ignored). (15 marks)

IV. (a) Explain the starting methods used to start 3 phase induction motors. (15 marks)

Or

(b) A 3.3 kV, 20 pole, 50 Hz, 3 phase induction motor has rotar resistance and standstill reactance of 0.014 Ω and 0.113 Ω per phase respectively. Calculate (i) the speed at which the torque developed is maximum and ; (ii) the ratio of full load torque to maximum torque, if the full load torque is delivered at 288 rpm. (15 marks)

V. (a) How would you extend the range of dc ammeters and voltmeters ? Explain with suitable diagrams. (15 marks)

Or

(b) Describe the construction and working of a dc potentiometer. (15 marks)

[4 × 15 = 60 marks]