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C 14986 (Pages 2) Name.....

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COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, MAY 2011

ME 04 108—BASIC ELECTRICAL ENGINEERING

Time : Three Hours Maximum : 100 Marks

Part A

I. (a) A coil of 200 turns in sound uniformly over a wooden ring having a mean circumference of 600 mm and a uniform cross-sectional area of 500 mm^2 if the current through the coil is 4.0 A. Calculate (i) the magnetic field strength ; (ii) the flux density ; (iii) the total flux.

(b) Explain the principle of operation of Induction type energy meter with diagram.

(c) A coil having a resistance of 12 Ω and an inductance of 0.1 H is connected across of 100 V, 50 Hz supply. Calculate (i) the reaction and impedance of the coil ; (ii) the current ; (iii) the phase difference between the current and the applied voltage.

(d) Derive the expression of resonant frequency of a series RLC circuit.

(e) Explain the principle of operation of a transformer.

(f) Explain the magnetization current of a transformer with neat sketches.

(g) A 4 pole, lap wound d.c. generator has a useful flux of 0.07 Wb/pole. Calculate the generated e.m.f. when it is rotated at a speed of 900 r.p.m. with the help of prime mover. Armature consists of 440 number of conductors. Also calculate the generated e.m.f. if lap wound armature is replaced by wave wound armature.

(h) Explain the significance of back e.m.f. in D.C. motor.

(8 × 5 = 40 marks)

Part B

II. (a) (i) State linearity theorem. (7 marks)

(ii) With neat diagram, explain about the hysteresis and eddy current losses in ferromagnetic materials.

(8 marks)

Or

(b) (i) Explain the principles of electrodynamic wattmeter with a neat sketch. (8 marks)

(ii) Explain the principle of operation of moving-iron instruments. (7 marks)

Turn over

III. (a) (i) A single phase motor operating off a 400 V, 50 Hz supply is developing 10 kW with an efficiency of 84% and a power factor of 0.7 lagging. Calculate (a) the input apparent power ; (b) the active and reactive components of the current ; (c) the reactive power in kilovars.

(8 marks)

(ii) A circuit, having a resistance of 4.0 Ω and inductance of 0.50 H and a variable capacitance in series, in connected across of 100 V, 50 Hz supply. Calculate (a) capacitance to give resonance ; (b) the voltages across the inductance and the capacitance.

(7 marks)

Or

(b) (i) Derive the power relationship of a star-connected 3ϕ A.C. circuits. (7 marks)

(ii) Show that a 3ϕ power can be measured with the help of 2 watt meters. (8 marks)

IV. (a) (i) Discuss in detail about the construction of a transformer. (8 marks)

(ii) Derive the e.m.f. equation of a transformer. (7 marks)

Or

(b) (i) Discuss in detail about O.C. and S.C. tests of a transformer. Also derive its efficiency.

(8 marks)

(ii) Write a short note on Autotransformers. (7 marks)

V. (a) (i) Derive the e.m.f. equation of D.C. generators. (8 marks)

(ii) Explain the load characteristics of D.C. generator with neat curves. (7 marks)

Or

(b) (i) Describe in detail the construction and principle of operation of D.C. motors. (8 marks)

(ii) Derive torque and speed equations of D.C. motor. (7 marks)

[4 × 15 = 60 marks]