

**COMBINED FIRST AND SECOND SEMESTER B.TECH. (ENGINEERING)
DEGREE EXAMINATION, DECEMBER 2006**

CS 04 109—BASIC ELECTRICAL ENGINEERING

(CS, IT, PT)

[2004 admissions]



Time : Three Hours

Part A

1. (a) Show the conversion of star to delta and vice-versa with an example.
- (b) State and explain superposition theorem.
- (c) A series RLC circuit is connected to a 200 V, 50 Hz supply. When it is varied, the maximum current obtained is 0.4 amperes and the voltage across the capacitor then is 330 volts. Find the circuit constants.
- (d) State and derive the properties of Laplace transform.
- (e) Compare the properties of electric circuits and magnetic circuits.
- (f) Explain the characteristics of an ideal d.c. generator.
- (g) Explain the methods of starting a synchronous motor with neat sketches.
- (h) Explain the construction and working of an moving coil ammeter.

(8 × 5 = 40 marks)

Part B

2. (a) (i) Explain the characteristics of series and parallel circuits. (8 marks)
- (ii) Calculate the voltage across AB in the network shown in Fig. 1. Indicate the polarity of the voltage :

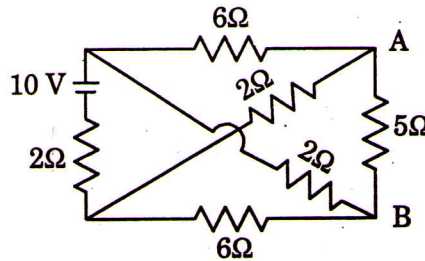


Fig. 1

(7 marks)

Or

Turn over

(b) (i) For the network shown in Fig. 2, find the equivalent resistance between the terminals B and C.

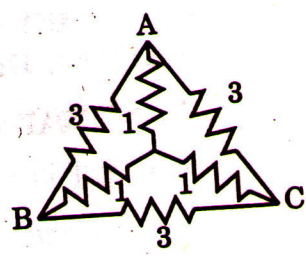


Fig. 2

(8 marks)

(ii) Draw the dual circuit for the circuit shown in Fig. 3. Explain the steps.

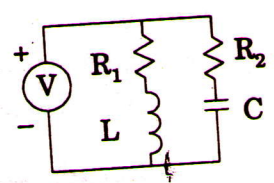


Fig. 3

(7 marks)

3. (a) (i) Define (1) frequency ; (2) phase ; (3) form factor ; (4) peak factor. Explain the term phase difference.

(8 marks)

(ii) Find effective and average values for the following waveform in Fig. 4 :-

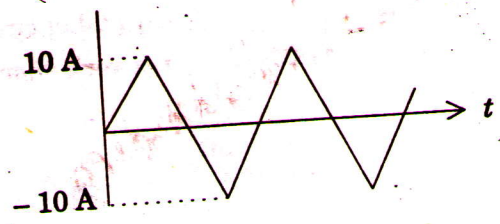


Fig. 4

(7 marks)

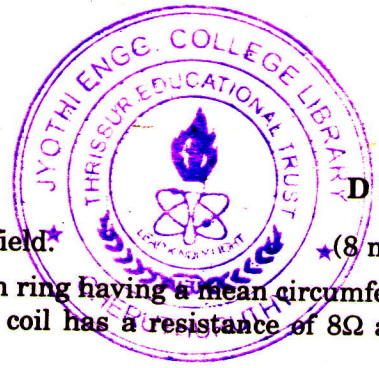
Or

(b) (i) State and prove the properties of Inverse Laplace transform.

(8 marks)

(ii) Explain in detail the principle of measurement of power using 2 wattmeter method.

(7 marks)



4. (a) (i) Derive an expression for energy stored in magnetic field. (8 marks)
(ii) A coil is wound uniformly with 300 turns over an iron ring having a mean circumference of 400 mm. and a cross-section of 500 mm.² If the coil has a resistance of 8Ω and is connected across a 20 V d.c. supply, calculate :

- 1 The m.m.f. of the coil.
- 2 Magnetic field strength (H).
- 3 Total flux.
- 4 The reluctance of the ring.

Assume the value of $\mu_r = 900$.

(7 marks)

Or

- (b) (i) Draw the equivalent circuit of a transformer and explain. (8 marks)
(ii) Explain in detail the characteristics of D.C. motors. Explain their potential applications. (7 marks)
5. (a) (i) Explain the principle of operation of synchronous machines, with neat sketches. Also explain the construction features. (8 marks)

- (ii) Differentiate single-phase and 3φ induction motors. (7 marks)

Or

- (b) (i) Explain the classification and types of measuring instruments. (8 marks)
(ii) Write short notes on :
1 Electronic multimeter.
2 Digital instruments.

(7 marks)

[4 × 15 = 60 marks]