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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2008.

Second Semester

Electrical and Electronics Engineering

EE 1151 — ELECTRIC CIRCUIT ANALYSIS

(Common to Electronics and Instrumentation Engineering, Instrumentation and Control Engineering and B.E. (Part-Time) First Semester – Electrical and Electronics Engineering – (Regulation 2005))

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Define RMS value.

2. What are ideal sources?

3. State the advantages of Laplace transform application to the solution of electric circuits.

4. Define poles and zeros of network function.

5. Define power factor in terms of load parameters.

6. Express resonant frequency interms of half power frequencies.

7. Give the algorithmic steps of loop current analysis.

8. State reciprocity theorem.

9. What is DOT convention?

10. Draw the circuit diagram for measuring three phase reactive power using one wattmeter.

PART B — (5 × 16 = 80 marks)

11. (i) Show that the sum of wattmeter readings in two wattmeter method gives the total power in three phase circuit whether the load is balanced or not. (9)

(ii) Also show that the power factor of the load can be calculated using the wattmeter readings. (7)

12. (a) (i) State and explain Kirchoff's laws. (8)

(ii) Find the average value, rms value, form factor and peak factor of a periodic wave having the following values for equal time intervals changing suddenly from one value to the next : 0, 5, 10, 20, 50, 60, 50, 20, 10, 5, 0, –5, –10 V etc. What would be the rms value of a sine wave having the same peak value. (8)

Or

(b) (i) Discuss source transformation. (6)

(ii) Derive expressions for star connected arms in terms of delta connected arms. (10)

13. (a) (i) State and explain initial and final value theorems. (8)

(ii) A series RC circuit has R = 10 Ω and C = 0.1 F. A constant voltage of 20 V is applied to the circuit at t = 0. Determine the voltage a/c the resistor and the voltage a/c the capacitor. (8)

Or

(b) Derive an expression for current response of RLC series circuit with sinusoidal excitation. Assume the circuit is working in critical damping condition.

14. (a) A 100 ohm resistor and a 20 mH inductor are connected in series across a 230 V, 50 Hz supply. Find circuit impedance, admittance, current voltage a/c resistance, voltage a/c inductor apparent power, active power and power factor.

Or

(b) A series RLC circuit has R = 20 Ω, L = 0.005 H and C = 0.2×10^{-6}F. It is fed from a 100 V variable frequency source. Find (i) frequency at which current is maximum (ii) impedance at this frequency and (iii) voltage a/c inductance at this frequency.

15. (a) Use Node voltage method to find voltage of node 'm' and currents I_1, I_2 and I_3 in the circuit of Fig. Q. 15 (a).

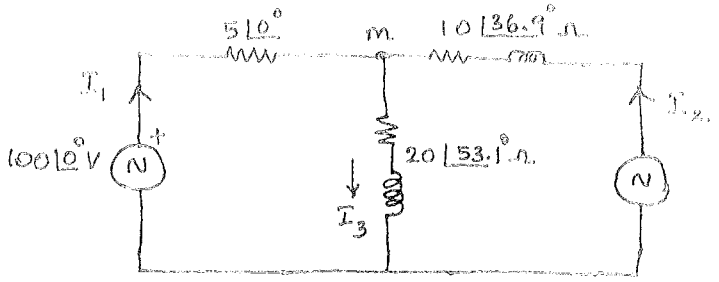

Fig. Q. 15 (a)

Or

(b) (i) State and explain maximum power transfer theorem. (8)

(ii) State and explain Thevenin's theorem. (8)