Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 80490

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Second Semester

Electrical and Electronics Engineering

EE 2151/EE 25/10133 EE 205/080280005/EE 1151 – CIRCUIT THEORY

(Common to Electronics and Instrumentation Engineering and Instrumentation and Control Engineering)

(Regulations 2008/2010)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find the equivalent conductance G_{eq} of the circuit shown in Fig.1

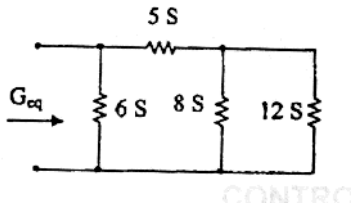

Fig. 1

2. Define 'Mesh analysis' of a circuit.

3. State the voltage division principle for two resistor in series and the current division principle for two resistors in parallel.

4. State Maximum power transfer theorem.

5. Define Quality factor of inductance.

6. Define self inductance of a coil.

7. What is meant by the term time constant for series RL and RC circuit?

8. What do you mean by steady state value?

9. What are the advantages of three phase system?

10. Write the current relations in star and delta connections of a three phase circuit.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the current I_L in the circuit shown in figure 11a(i). (8)

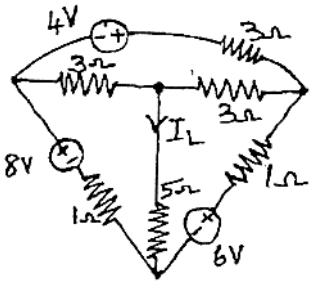

Fig.11 a(i)

(ii) For the circuit shown in Fig 11 a(ii) determine the total current I_T, phase angle and power factor. (8)

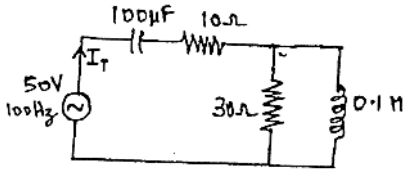

Fig.11 a(ii)

Or

(b) For the circuit shown in Fig.11(b), determine the value of V_2 such that the current through (3+j4) Ω impedance is zero. (16)

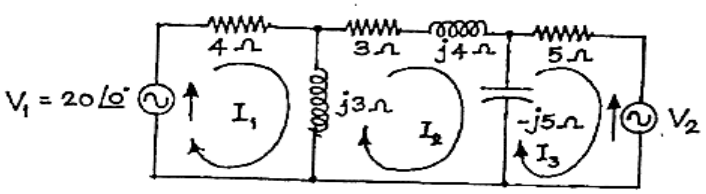

Fig.11(b)

12. (a) Obtain the star connected equivalent for the delta connected circuit shown in Figure Q. 12(a). (16)

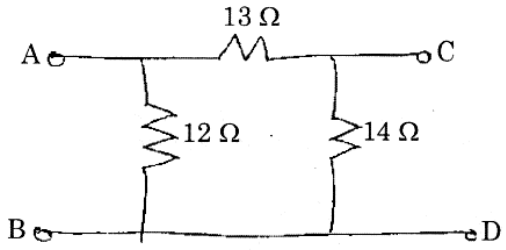

Figure.12(a)

Or

(b) (i) State Thevenin's theorem. (6)

(ii) Determine the Thevenin's equivalent circuit across AB for the given circuit shown in Fig.12(b) (ii). (10)

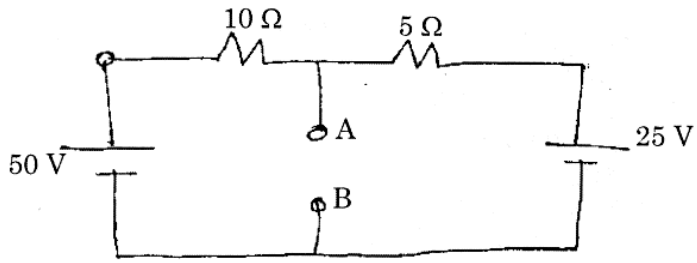

Fig.12(b) (ii)

13. (a) A RLC series circuit has R = 60 Ω, L = 160 mH and C = 160 μf. Find the resonant frequency under resonant condition obtain the current, power and the voltage drops the various elements if the applied voltage is 300 V. (16)

Or

(b) Illustrate the amplification factor with respect to frequency and coefficient of coupling of a single tuned circuit in detail. (16)

14. (a) Obtain the expression for current in DC response of an RL series circuit. (16)

Or

(b) Obtain the expression for current in Sinusoidal response of an RL series circuit. (16)

15. (a) (i) What are the advantages of three phase system? (4)

(ii) The two wattmeter method produces wattmeter readings $P_1 = 1560$ W and $P_2 = 2100$ W when connected to a delta connected load. If the line voltage is 220 V, calculate (1) the per-phase average power (2) the per-phase reactive power (3) the power factor, and (4) the phase impedance. (12)

Or

(b) (i) Prove that the total instantaneous power in a balanced three-phase system is constant and is equal to the average power whether the load is star or delta connected. (10)

(ii) An unbalanced star-connected load has balanced voltages of 100 V and RBY phase sequence. Calculate the line currents and the neutral current. Take $Z_A = 150\ \Omega$, $Z_B = (10 + j5)\ \Omega$, $Z_C = (6 - j8)\ \Omega$. (6)

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