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Question Paper Code : 20507

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Second Semester

Electrical and Electronics Engineering

EE 8251 — CIRCUIT THEORY

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

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Compare Mesh and Node analysis.

2. For an electric circuit with two resistors having 3 ohms and 5 ohms in parallel are supplied with 60 V supply, find the total current passing through the circuit.

3. What is the equivalent value of each resistor in delta connected network, if the. resistors in star connected network is 5 ohms each.

4. Compare Thevenin's and Norton's theorem.

5. Specify the time constant of R-L and R-C circuit.

6. How does an capacitor act at $t=0^+$ and $t=\infty$?

7. Compare average value and RMS value.

8. Find the current through the circuit with 15 Ohms resistor across a voltage source of 100 Cos (70t-50°) Volts.

9. Define Bandwidth.

10. Compare self inductance and mutual inductance.

PART B — (5 × 13 = 65 marks)

11. (a) Use mesh analysis to determine the currents i_1, i_2 and i_3 as shown in Fig. 11 (a)

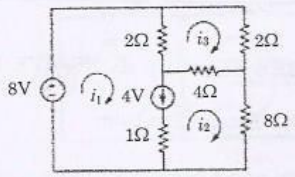

Fig. 11 (a)

Or

(b) For the given circuit, Fig. 11 (b) obtain v_1 and v_2.

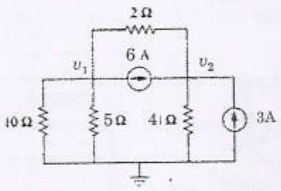

Fig. 11 (b)

12. (a) Find the Norton's Equivalent circuit across a-b for the circuit in Fig 12 (a).

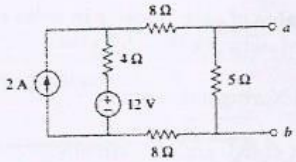

Fig. 12 (a)

Or

(b) Find the value of maximum power transfer in the circuit of Fig. 12 (b).

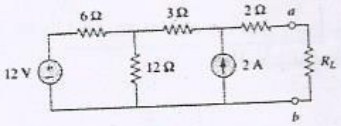

Fig. 12 (b)

13. (a) The switch in has been in position A for a long time as shown in fig. 13 (a). Assume the switch moves instantaneously from A to B at t = 0. Find v for $t > 0$.

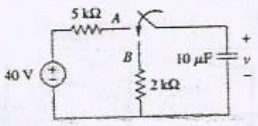

Fig. 13 (a)

Or

(b) For the circuit in Fig. 13(b) find i_o for $t>0$

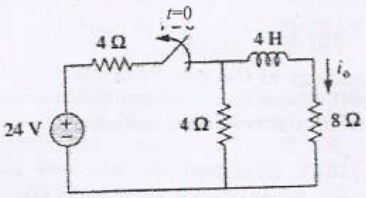

Fig. 13 (b)

14. (a) A three-phase, four-wire, 150-V, as shown in Fig 14 (a), CBA system has a Y-connected load, Obtain all line currents and draw the phasor diagram.

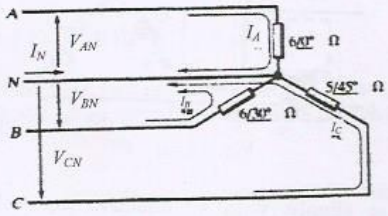

Fig. 14 (a)

Or

(b) Calculate the readings of the wattmeter (W) connected as shown in Fig 14 (b). The load is the balanced star-connected one, with impedance of per phase, fed from a three-phase, 400 V, balanced supply, with the phase sequence as R-Y-B.

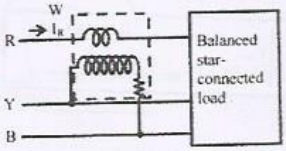

Fig. 14 (b)

15. (a) Derive the expression to obtain the frequency of parallel resonance.

Or

(b) Compute the voltage V for the coupled circuit shown in Fig. 15 (b)

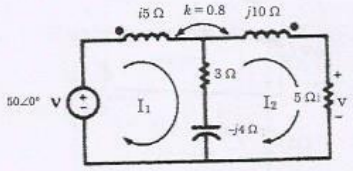

Fig. 15 (b)

PART C — (1 × 15 = 15 marks)

16. (a) Calculate the readings of the two wattmeters (w_1 and w_2) connected to measure the total power for a balanced star-connected load shown in Fig. 16(a), fed from a three-phase, 400 V, balanced supply with phase sequence as R-Y-B. The load impedance per phase is $(w_1 + w_2) + (20 + j15)\Omega$. Also find the line and phase currents, power factor, total power, total reactive VA and total VA.

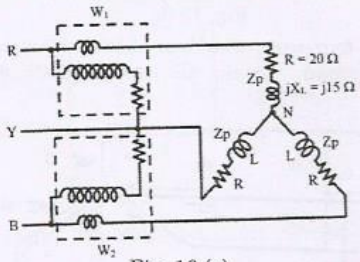

Fig. 16 (a)

Or

(b) A three-phase supply, with an effective line voltage 240 V, has an unbalanced delta-connected load shown in Fig. 16 (b). Obtain the line currents and the total power.

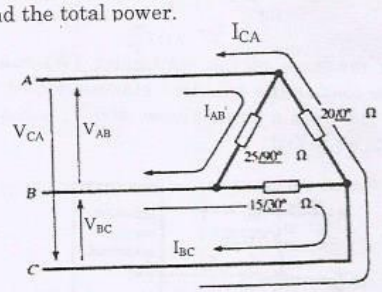

Fig. 16 (b)