U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: III**
Branch: ES Cluster (EEE/ET/ECE/EIE/MD) **Duration: 3 hrs.**
Course Code: 15ES3GCLCA **Max Marks: 100**
Course: Linear Circuit Analysis

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any may suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

SUPPLEMENTARY EXAMS 2023

UNIT - I

1 a) The value of R in the network shown in Fig 1(A) is 15 Ohm. What is the equivalent resistance between A and B terminals. **6**

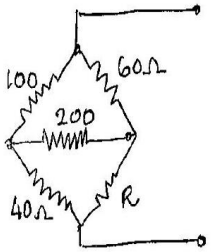

Fig. 1(A).

b) Using the source transformation and source shifting find a single current source in series with a resistance for the network shown in figure 1(B). **8**

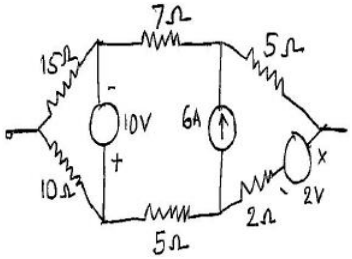

Fig. 1(B)

c) Find the power delivered by the 15 V source in the circuit shown in Fig.1.C by mesh current method. **6**

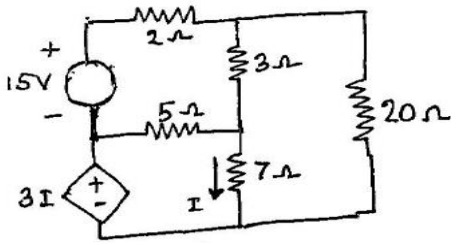

Fig. 1 (C)

OR

2 a) The voltage applied across A and B for the network shown in figure 2(A) is 12 V. Find the current I in 8 ohm resistor. **6**

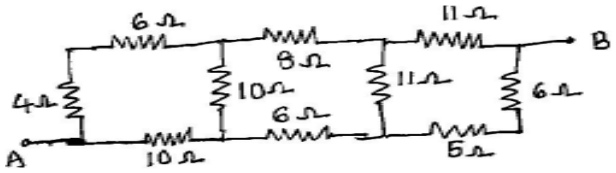

Fig. 2(A)

b) Use loop current method to determine the voltage at all nodes of the network shown in figure 2 (B) **8**

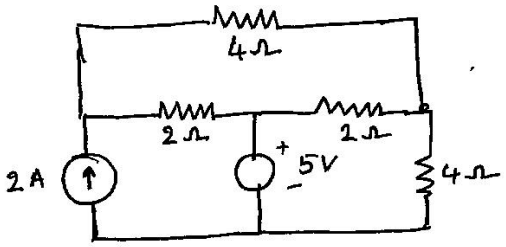

Fig. 2 (B)

c) Find the power delivered by the voltage sources in the circuit shown in figure 2 (C). Use Loop analysis. **6**

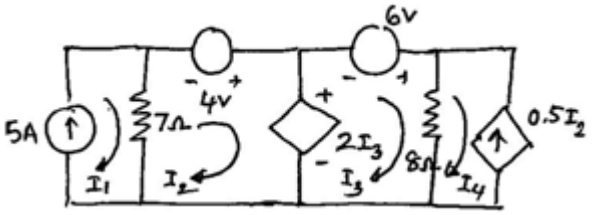

Fig.2(C)

UNIT – II

3 a) The directed graph of a network is shown in figure 3 (A). Choose the tree comprising the branches 1, 2, 3, 4 and 5. Determine the tie-set matrix and cut-set matrix. **8**

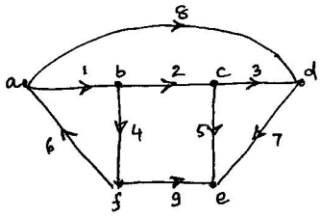

Fig.3 (A)

b) Draw the dual of the network shown in Figure 3 (B). Also write the Mathematical models for the given network and its dual. **6**

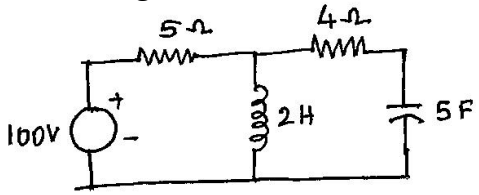

Fig.3 (B)

SUPPLEMENTARY EXAMS 2023

c) A series RLC circuit has R = 50 Ohms, L = 0.01 H and C = 0.04 μF and is connected to ac Source of 100 V. **6**
Find (i) the resonance frequency,
(ii) the half power frequencies
(iii) the frequency at which voltage across the capacitor is maximum.

UNIT - III

4 a) State and explain superposition theorem. **6**

b) Find the current power in the 1 ohm resistor in the circuit shown in figure 4(B). Use Norton's theorem in figure 4 (B). **8**

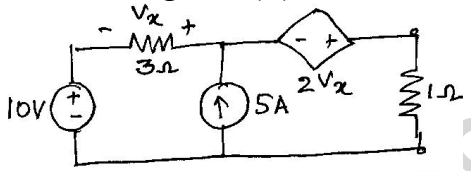

Fig 4 (B)

c) Find the Thevenin's Equivalent circuit across A and B terminals for the circuit shown in figure 4(C). **6**

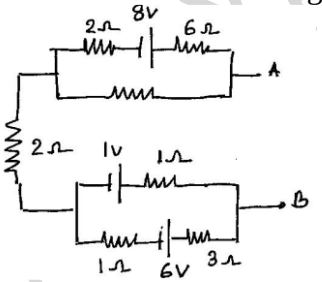

Fig 4 (C)

UNIT - IV

5 a) For the network shown in figure 5 (A), find i_1, i_2, $\frac{di_1}{dt}$, $\frac{di_2}{dt}$ and $\frac{d^2i_2}{dt}$ at t = 0^+. **10**

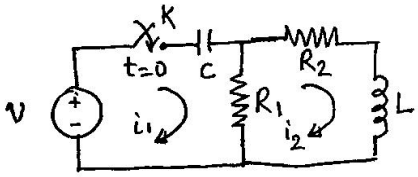

Fig. 5 (A)

b) Synthesize the periodic waveform shown in figure 5(B) and find its Laplace transformation. **10**

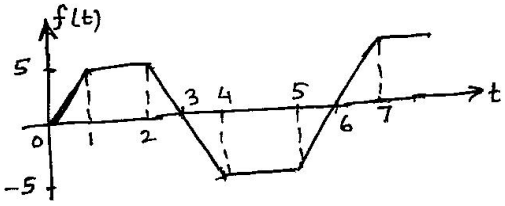

Fig. 5 (B)

OR

SUPPLEMENTARY EXAMS 2023

6 a) State and prove the following: **6**

(i) initial value theorem

(ii) Final value theorems.

b) Synthesize the function x(t) shown in figure 6(B) and hence determine the Laplace tranform of x(t). **6**

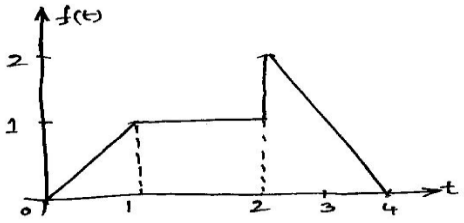

Fig. 6(B)

c) A series R-L circuit with R = 1 Ohm and L = 1 H is connected in parallel with another series R-C circuit of 2 Ohm resistance and ½ F capacitor are connected across a current source of 2 u(t). If the inductor and capacitor were unenergised initially, determine Vc(t) the voltage across the capacitor for t > 0. Use Lapace transform. **8**

UNIT – V

7 a) Determine Y,Z – parameters for the network shown in figure 7(A) **10**

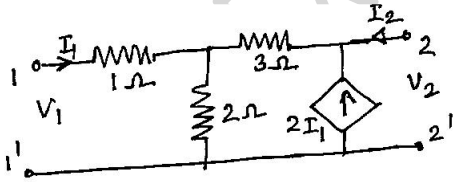

Fig. 7(A)

b) Obtain Z parameters in terms of Y parameters and h in terms of Y parameters. **10**

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SUPPLEMENTARY EXAMS 2023