U.S.N.										

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

Autonomous Institute Affiliated to VTU

August 2023 Semester End Make-Up Examinations

Programme: B.E. **Semester: III**
Branch: Electrical & Electronics Engineering **Duration: 3 hrs.**
Course Code: 22EE3PCECT **Max Marks: 100**
Course: ELECTRICAL CIRCUIT THEORY **Date: 10.08.2023**

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

UNIT - I

1 a) Convert the network shown in **Fig. 1a** into a single voltage source in series with resistance using source transformation and source conversion technique. **10**

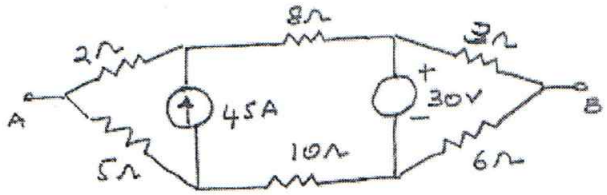
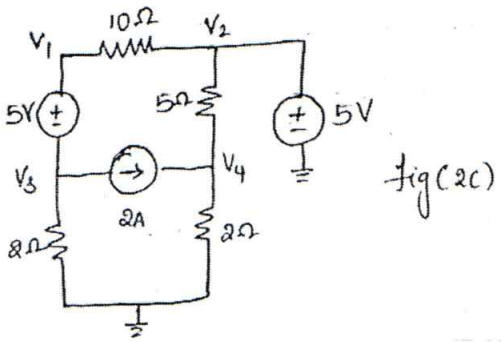


Fig. 1a

b) For the network shown in fig(2c) determine the node voltages V_1, V_2, V_3 and V_4 using nodal analysis. **10**



OR

2 a) In the circuit shown in the **Fig. 2a**, determine V_2, which results in zero current through the 4Ω resistor. Use mesh analysis **10**

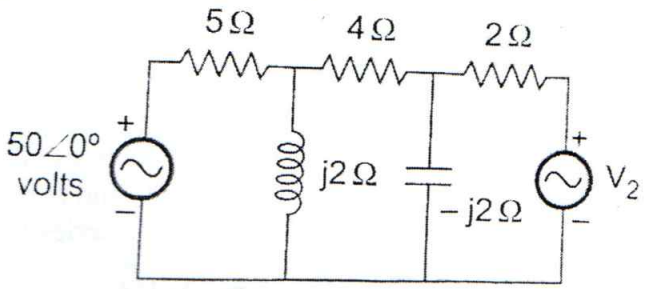


Fig. 2a

b) Determine the equivalent resistance across the terminals a-b using star delta transformation for **Fig. 2b** **10**

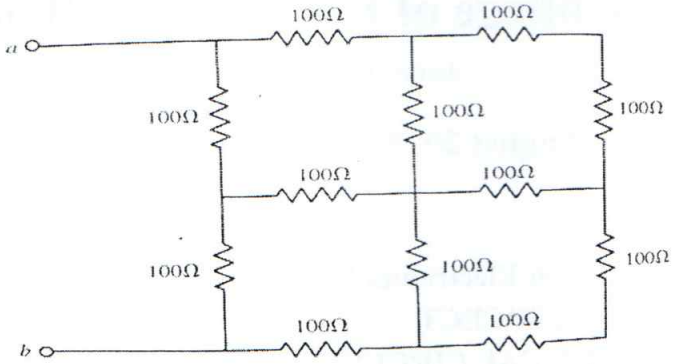


Fig. 2b

UNIT - II

3 a) Determine the current in 2Ω resistor for the **Fig. 3a** using superposition theorem. **06**

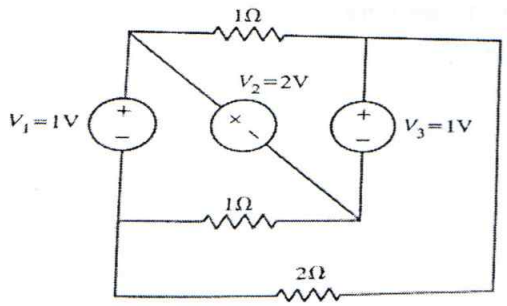


Fig. 3a

b) In the single current source circuit shown in Fig. 3.b. Calculate the voltage V_x Interchange the current source and the resulting voltage 'V_x' Is the reciprocity theorem verified? **06**

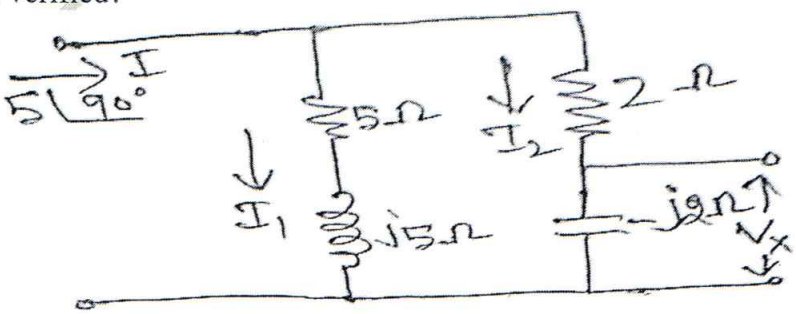


Fig. 3b

c) Define Superposition theorem, Reciprocity theorem, Millman's theorem and Thevenin's theorem **08**

UNIT - III

4 a) A series RC branch with R = 20Ω and C= 1μF is shunted by an inductor of resistance 20Ω and inductance 1H. This is supplied by a DC source of 100V through a series resistance of 10Ω. There is a switch across 10Ω which is closed at t=0. Solve for the currents in L and C and their derivatives at $t=0^+$. **10**

b) Prove that the resonating frequency in a series RLC circuit is geometric mean of half power frequencies i.e $f_0 = \sqrt{f_1 f_2}$ **10**

OR

5. a) What is the significance of initial conditions? Write a note on initial and final conditions for basic circuit elements **07**

   b) Derive an expression for Q factor of series resonant ciruit. **08**

   c) A series RLC circuit has R= 10Ω, L=0.1H and C= 100μF and is connected across 200V variable frequency source. Find i) resonant frequency, ii) impedance at this frequency, iii) voltage across inductor and capacitor at this frequency, iv) quality factor, v) bandwidth **05**

UNIT - IV

6 a) State and prove initial and final value theorem **08**

   b) Find the initial value of $F(S) = \frac{s+1}{(s+1)^2+9}$ **02**

   c) Synthesize the waveform shown in the **Fig. 6.c** in terms of gate functions **10**

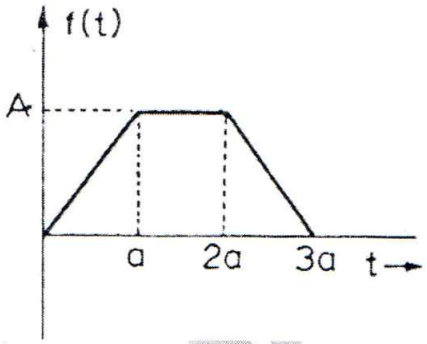


Fig. 6.c

UNIT - V

7 a) Express 'Z' parameters in terms of 'Y' parameters and what are 'T' parameters? **10**

   b) Determine 'Y' parameter of the network shown in Fig.7. b. **10**

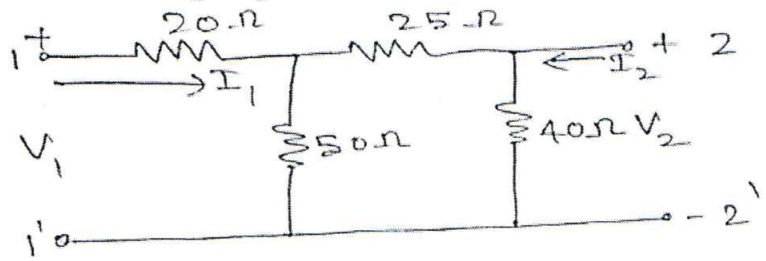


Fig. 7b

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