CBCS SCHEME

USN | | | | | | | | | | |

15EE32

# Third Semester B.E. Degree Examination, Feb./Mar. 2022
## Electric Circuit Analysis

Time: 3 hrs. Max. Marks: 80

**Note:** ***Answer any FIVE full questions, choosing ONE full question from each module.***



### Module-1

1 a. Using source transformation reduce the network, shown in Fig Q1(a) into a single source.

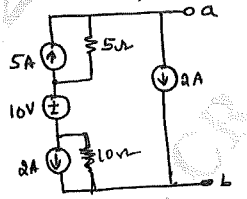


Fig Q1(a) **(04 Marks)**

b. Using star/delta transformation, determine the resistance between A and B of network shown in Fig Q1(b).

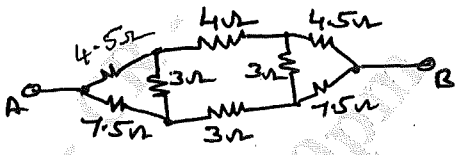


Fig Q1(b) **(06 Marks)**

c. Write the mesh equation for the circuit shown in Fig Q1(c), and determine mesh currents using mesh analysis.

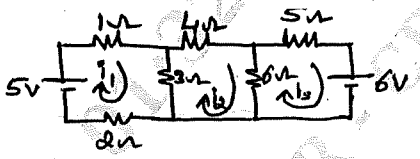


Fig Q1(c) **(06 Marks)**

**OR**

2 a. Define the following terms with reference the resonance circuit i) Resonance ii) Quality factor iii) Bandwidth iv) Selectivity. **(04 Marks)**

b. A serial RLC circuit has R = 4Ω, L = 1mH, C = 10μF. Calculate Q-factor, bandwidth and Resonant frequency $f_1$ and $f_2$. **(05 Marks)**

c. Find the power delivered by 5A current source using nodal analysis for the circuit, shown in Fig Q2(c).

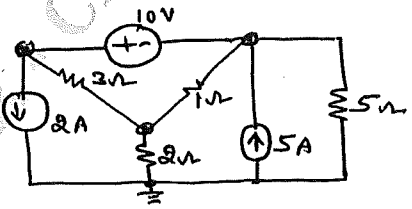


Fig Q2(c) **(07 Marks)**

### Module-2

3 a. For the Network shown in Fig Q3(a), obtain the Thevenin's equivalent circuit and find the load current through $R_L$.

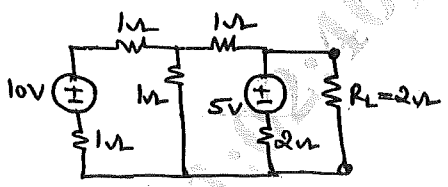


Fig Q3(a) **(08 Marks)**

b. For the Network shown in Fig Q3(b), obtain the Norton's equivalent circuit and find the current through Load $R_L$.

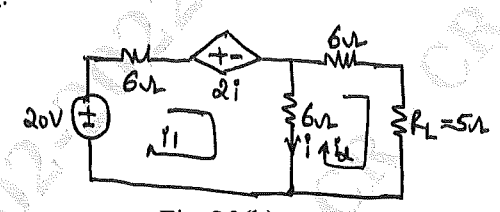


Fig Q3(b) **(08 Marks)**

**OR**

4 a. State and explain the superposition theorem. **(05 Marks)**

b. Using Millman's theorem find current through (5 + j5)Ω for the network, shown in Fig Q4(b).

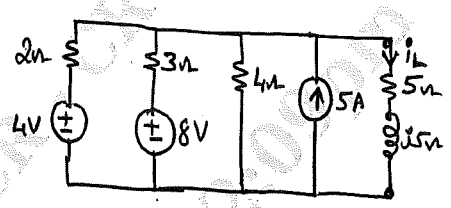


Fig Q4(b) **(05 Marks)**

c. Find $I_x$ and hence verify reciprocity theorem for the network, shown in Fig Q4(c).

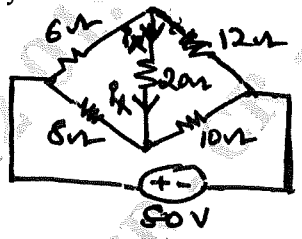


Fig Q4(c) **(06 Marks)**

## Module-3

5 a. Discuss with relevant theory how resistor, capacitor inductor elements behave at $t = 0^+$ and $t = \infty$ **(06 Marks)**

b. In the network shown in Fig Q5(b), switch 'K' is changed from 100V to 10μF at time t = 0. A steady state condition have been reached before switching.

Find the value of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$.

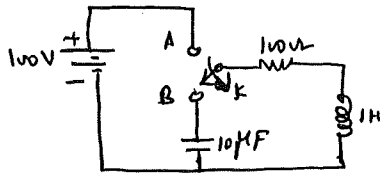


Fig Q5(b) **(10 Marks)**

**OR**

6 a. In the current shown in Fig Q6(a) determine compute solution for current when switch 'K' is closed at t = 0. Applied voltage is v(t) with is given as 100 cos($10^3$t + π/2).

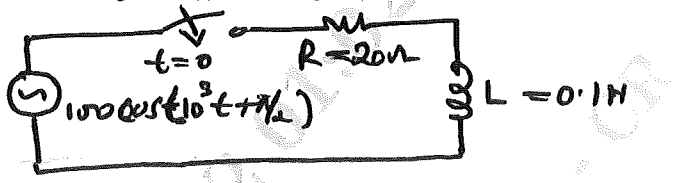


Fig Q6(a) **(08 Marks)**

b. For the network shown in Fig Q6(b), find $\frac{d_i(0^+)}{dt}$, $\frac{d_{i_2}(0^+)}{dt}$ and $\frac{d^2_{i_2}(0^+)}{dt^2}$

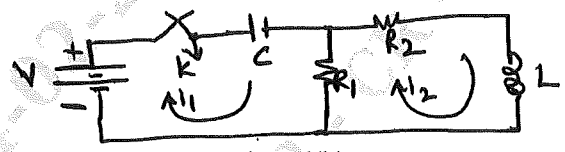


Fig Q6(b) **(08Marks)**

## Module-4

7 a. Obtain the Laplace transform of f(t) for the waveform shown in Fig Q7(a).

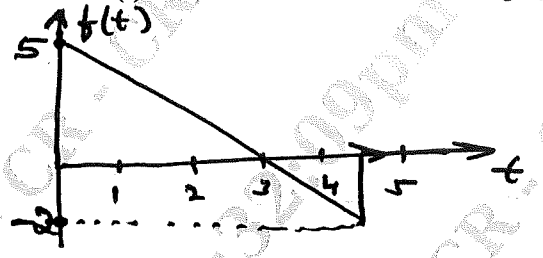


Fig Q7(a) **(08 Marks)**

b. Obtain the Laplace transform and the periodic signal shown in Fig Q7(b).

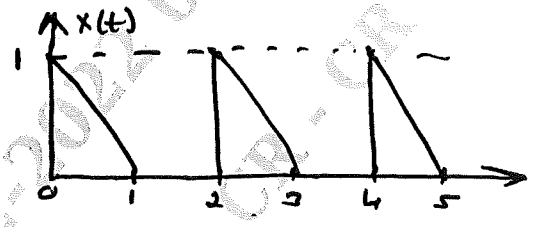


Fig Q7(b) **(08 Marks)**

**OR**

8 a. State and explain convolution theorem. **(08 Marks)**

b. Obtain the inverse Laplace transform of given F(s)

i) $F(s) = \frac{s+2}{s(s+3)(s+4)}$ ii) $F(s) = \frac{s^2+5}{s(s+2)^2}$ **(08 Marks)**

## Module-5

9 a. For unbalanced delta connected load find phase currents, line currents and power consumed in each phase, When sequence is ABC and RYB. [Refer Fig Q9(a)]

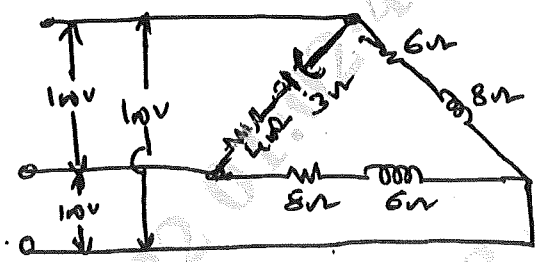


Fig Q9(a) **(08 Marks)**

b. Explain the open circuit impedance parameters. And also explain the equivalent circuit of open circuit impedance parameter. **(08 Marks)**

**OR**

**10** a. Determine Y-parameter of the two part network shown in Fig Q10(a).

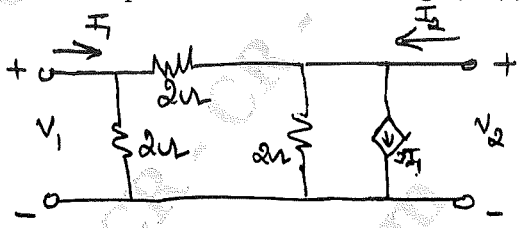


Fig Q10(a) **(08 Marks)**

b. Determine the chain parameters for the network shown in Fig Q10(b)

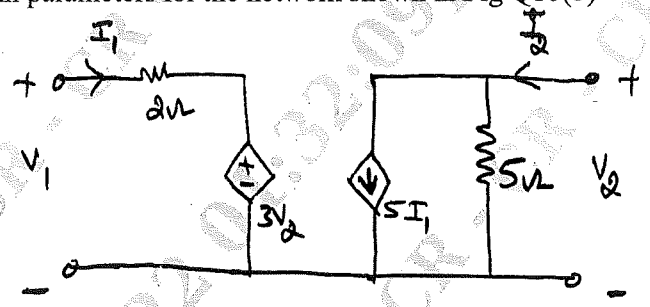


Fig Q10(b) **(08 Marks)**

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