CBCS SCHEME

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

18EE32

Third Semester B.E. Degree Examination, Jan./Feb. 2021
Electric Circuit Analysis

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define :
i) Linear and non linear circuit
ii) Active and passive circuit
iii) Unilateral and bilateral circuit. **(06 Marks)**

b. For the circuit shown in Fig.Q1(b) determine resistance between M and N using star/delta transformation.

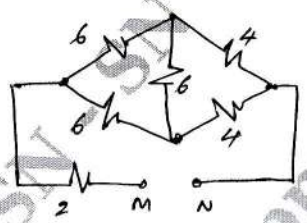

Fig.Q1(b) **(06 Marks)**

c. Use node voltage analysis to find node voltages in the network shown in Fig.Q1(c).

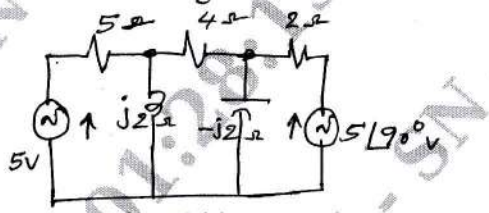

Fig.Q1(c) **(08 Marks)**

OR

2 a. Derive an expression for converting Delta to Star. **(06 Marks)**

b. Determine potential difference between M and N using source transformation of circuit shown in Fig.Q2(b).

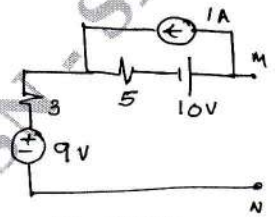

Fig.Q2(b) **(06 Marks)**

c. Use Mesh current analysis to find the current flowing in 30Ω resistor of circuit shown in Fig.Q2(c).

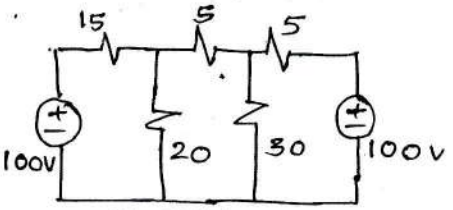

Fig.Q2(c) **(08 Marks)**

Module-2

3 a. State and prove reciprocity theorem. **(06 Marks)**

b. For the circuit shown in Fig.Q3(b) find 'I_X' using super position theorem.

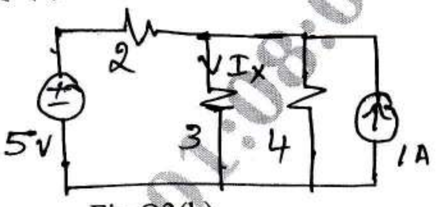

Fig.Q3(b) **(07 Marks)**

c. Use Milliman's theorem to find current in the circuit shown in Fig.Q3(c).

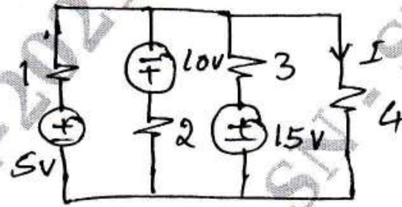

Fig.Q3(c) **(07 Marks)**

OR

4 a. State and obtain condition for maximum power when load impedance is equal to pure variable resistance. **(06 Marks)**

b. For the network shown in Fig.Q4(b), find current 'I' using Norton's theorem.

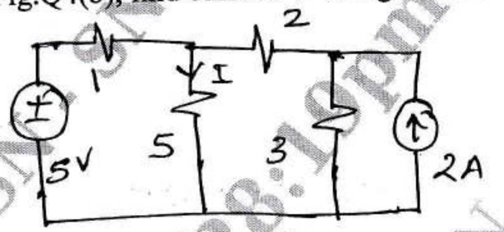

Fig.Q4(b) **(07 Marks)**

c. For the network shown in Fig.Q4(c). Draw Thevenin's equivalent circuit.

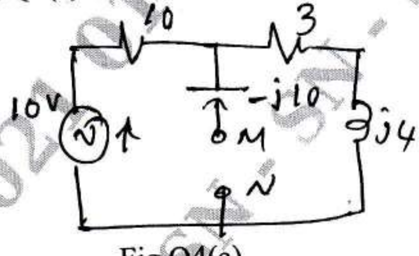

Fig.Q4(c) **(07 Marks)**

Module-3

5 a. Show that resonant frequency is the geometric mean of cut-off frequencies. **(07 Marks)**

b. A series RLC circuit has a resistance of 100Ω, an inductance of 0.5H and capacitance of 0.4μF. Find the resonant frequency, half power frequencies, band width and quality factor. **(07 Marks)**

c. For the circuit shown in Fig.Q5(c), find the value of inductance take w = 500r/s.

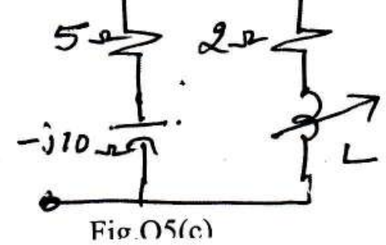

Fig.Q5(c) **(06 Marks)**

OR

6 a. Explain the behavior of R, L and C for initial condition. **(07 Marks)**

b. For the network shown in Fig.Q6(b) switch is closed at $t = 0$. Determine current and its first and second derivative at $t = 0^+$.

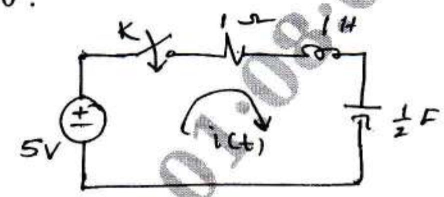

Fig.Q6(b) **(07 Marks)**

c. For the R – L circuit shown in Fig.Q6(c). Obtain the expression for current i(t) for $t \geq 0$.

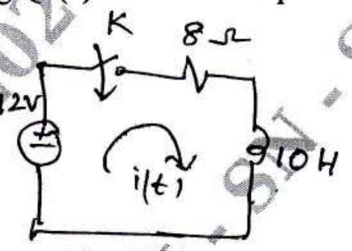

Fig.Q6(c) **(06 Marks)**

Module-4

7 a. State and prove initial value theorem. **(06 Marks)**

b. Find the inverse Laplace transform of

$$V(s) = \frac{10}{s(s+1)(s+2)}.$$ **(07 Marks)**

c. For the network shown in Fig.Q7(c), draw the transformed circuit and obtain the expression for current i(t) for $t \geq 0$.

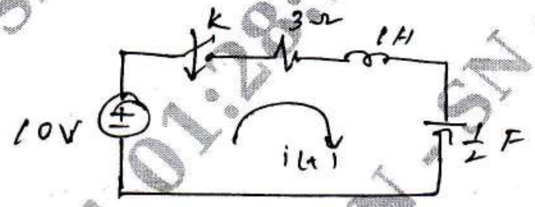

Fig.Q7(c) **(07 Marks)**

OR

8 a. Find the ILT of : i) step signal ii) Ramp iii) impulse signal. **(06 Marks)**

b. For the waveform shown in Fig.Q8(b) obtain the Laplace transform.

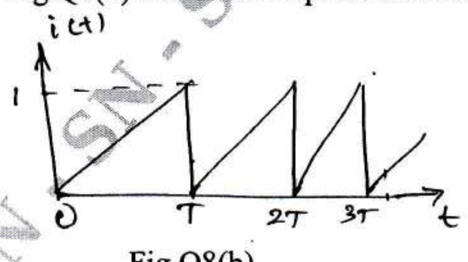

Fig.Q8(b) **(08 Marks)**

c. Find the initial and final value of following functions :

i) $V_1(s) = \dfrac{s^2 + 3s + 2}{s^3 + 3s^2 + 3s + 1}$

ii) $V_2(s) = \dfrac{10}{s(s+3)}$. **(06 Marks)**

Module-5

9 a. A 3 phase supply with line voltage of 250V has a unbalanced Delta connected load as shown in Fig.Q9(a). Determine line currents, active and reactive power for phase sequence A B C.

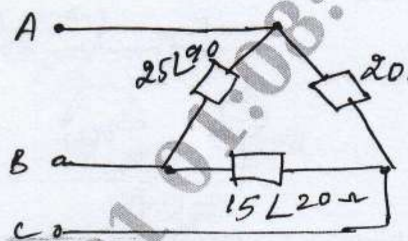

Fig.Q9(a) **(10 Marks)**

b. An unbalanced 4 wire star connected load has a balanced supply of 400V. For the phase sequence ABC, calculate the line currents and total power of the circuit shown in Fig.Q9(b).

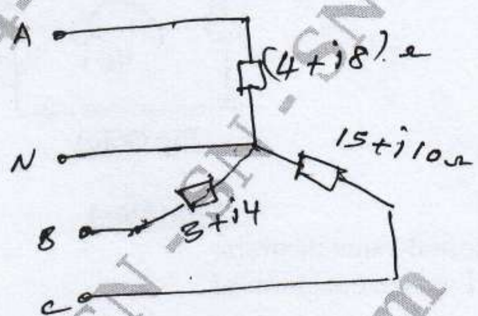

Fig.Q9(b) **(10 Marks)**

OR

10 a. Obtain the Impedance parameters interms of Admittance parameters. **(10 Marks)**

b. For the network shown in Fig.Q10(b) determine z-parameters.

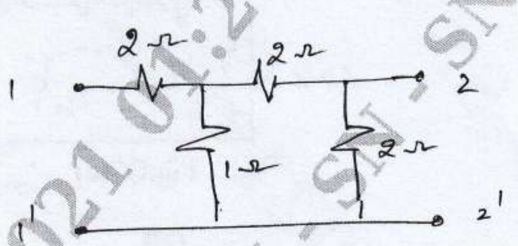

Fig.Q10(b) **(10 Marks)**

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