CBCS SCHEME

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

18EC32

Third Semester B.E. Degree Examination, June/July 2024
Network Theory

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Derive the expression for,
(i) Δ to Y transformation
(ii) Y to Δ transformation **(10 Marks)**

b. Determine the equivalent resistance between A and B of the network shown in Fig. Q1 (b). **(10 Marks)**

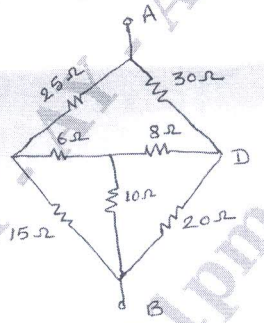

Fig. Q1 (b)

OR

2 a. Determine the current i_2 and voltage v_1 for the circuit shown in Fig. Q2 (a). **(10 Marks)**

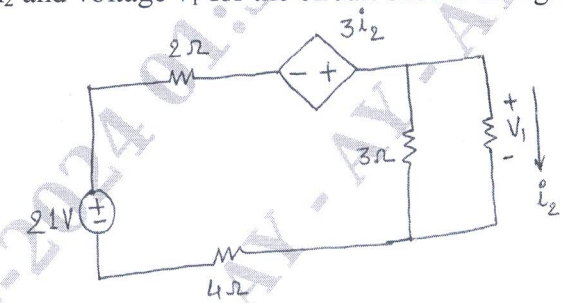

Fig. Q2 (a)

b. Determine the value of V_2, such that current through 4 Ω resistor is zero, using mesh current analysis method for the network shown in Fig.Q2 (b). **(10 Marks)**

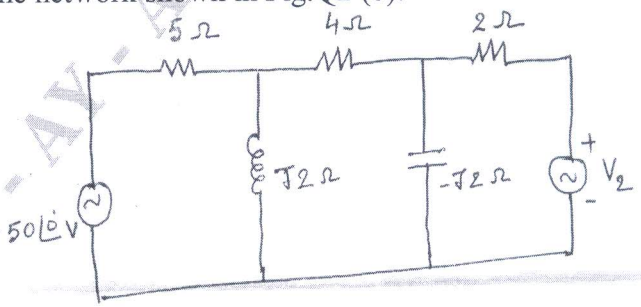

Fig. Q2 (b)

Module-2

3 a. State Super position theorem. Using superposition theorem, find the voltage V_1 across 3Ω resistor for the Network shown in Fig. Q3 (a). **(10 Marks)**

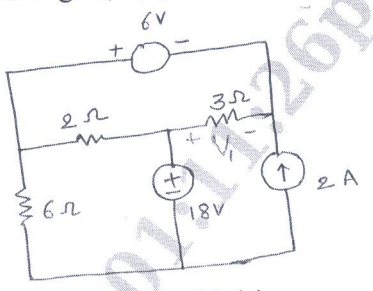

Fig. Q3 (a)

b. Evaluate the current through the load resistor R_L for the circuit shown in Fig. Q3 (b) using Millman's Theorem. **(10 Marks)**

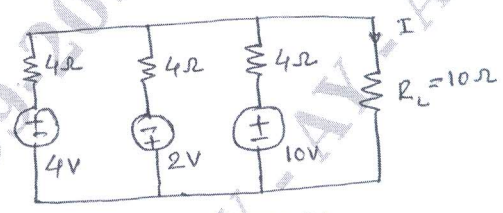

Fig. Q3 (b)

OR

4 a. Explain the procedure to find Norton's equivalent resistance in a network which has both dependent and independent sources with an example. **(06 Marks)**

b. Find the value of Z_L for which maximum power transfer occurs in the circuit shown in Fig. Q4 (b). **(04 Marks)**

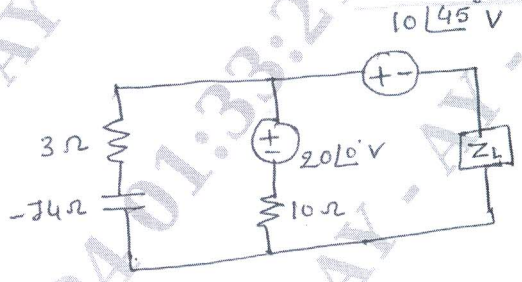

Fig.Q4 (b)

c. Determine the current flowing through the 6 Ω resistor for the circuit shown in Fig. Q4 (c) using Thevenin's theorem. **(10 Marks)**

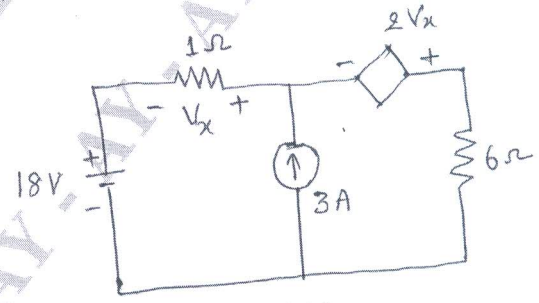

Fig. Q4 (c)

Module-3

5 a. Explain the transient behavior of R, L and C. Also explain the procedure for evaluating transient behavior. **(10 Marks)**

b. In the circuit shown in Fig. Q5 (b) the switch 'S' is moved from a to b at t = 0. Evaluate the values of i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$. If R = 1 Ω, L = 1 H, C = 0.1 μF and V = 100 V. Assume steady state is achieved when K is at 'a'. **(10 Marks)**

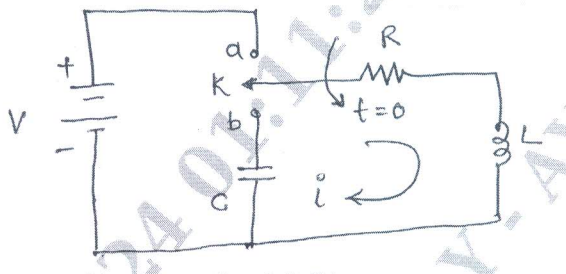

Fig. Q5 (b)

OR

6 a. Evaluate i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$ for the circuit shown in Fig. Q6 (a), when switch K is changed from position 1 to 2 at t = 0, the steady state having been reached before switching. **(10 Marks)**

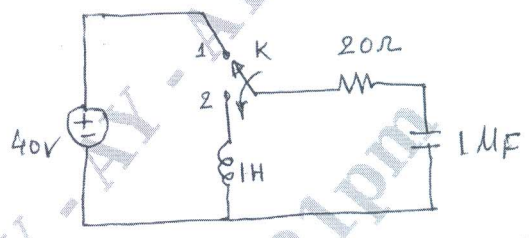

Fig. Q6 (a)

b. Find the values of i_1, i_2, $\frac{di_1}{dt}$, $\frac{di_2}{dt}$, $\frac{d^2i_1}{dt^2}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$ for the circuit shown in Fig. Q6 (b). **(10 Marks)**

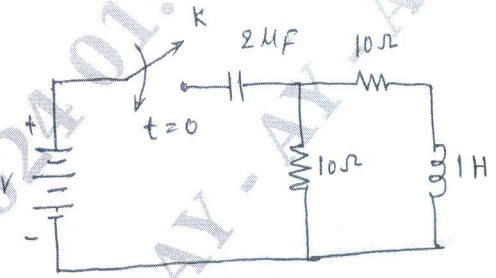

Fig. Q6 (b)

Module-4

7 a. Obtain Laplace transform of,
(i) Step function
(ii) Ramp function
(iii) Impulse function. **(10 Marks)**

b. Find the Laplace transform of the periodic waveform shown in Fig. Q7 (b). **(10 Marks)**

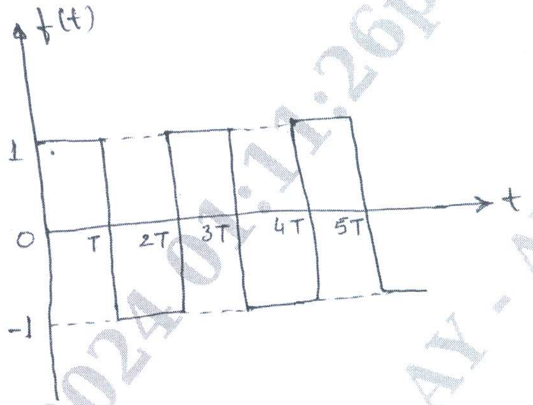

Fig. Q7 (b)

OR

8 a. Deduce the Laplace transform of the following :

(i) $\sin^2 t$

(ii) $\cos^2 t$

(iii) $\sin \omega t$ **(10 Marks)**

b. State and prove Initial and Final value theorems. **(10 Marks)**

Module-5

9 a. Express Z-parameters in terms of h-parameters and what are hybrid parameters. **(10 Marks)**

b. Determine the transmission parameters for the network shown in Fig. Q9 (b).

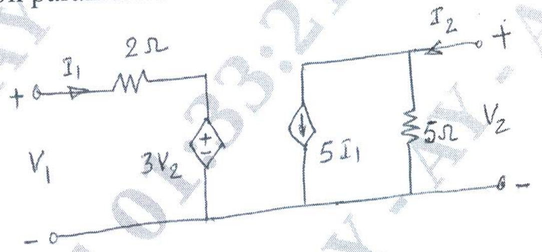

Fig. Q9 (b) **(10 Marks)**

OR

10 a. Define the followings :

(i) Resonance

(ii) Q-factor

(iii) Band width

(iv) Selectivity. **(08 Marks)**

b. Prove that the resonating frequency in a R-L-C series circuit is geometrical mean of half power frequencies is $f_0 = \sqrt{f_1 f_2}$. **(12 Marks)**

* * * * *