

SE (ELEC) SEM-3 NEP-2020 DEC-25

17/12/25 Marks: 60

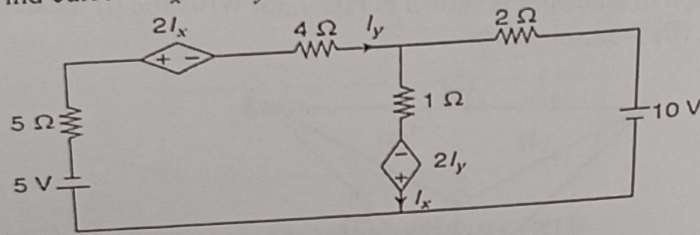
Time: 2 Hours

Note:

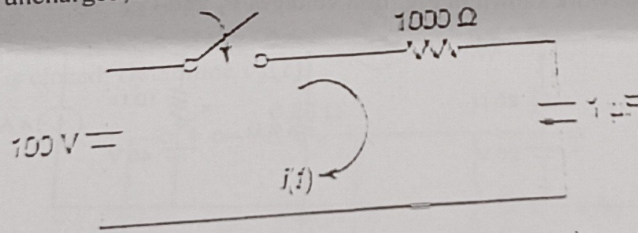
- (1) Question No. 1 is compulsory.
- (2) Answer any THREE from the remaining FIVE questions.
- (3) Assume suitable data if necessary and justify the same.
- (4) Figure to right indicates marks

Q.1 Attempt any five questions [compulsory problem] (15)

- (a) Find the Laplace Transform of $2t^2 + \cos 4t + e^{-2t}$ 3
- (b) Show that the function $\sinh z$ analytic and find their derivatives. 3
- (c) Find currents I_x and I_y of the network shown in Fig. 3

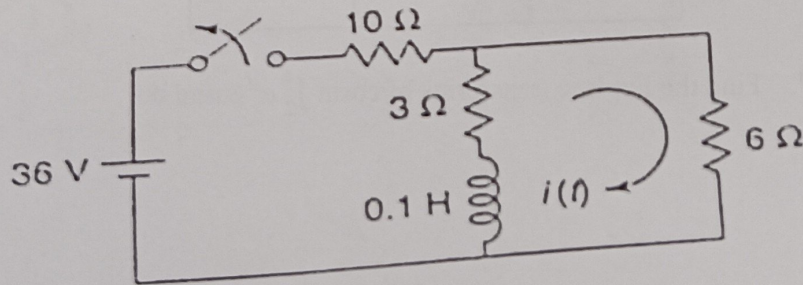


- (d) Define the term "Tree" and write its properties? 3
- (e) The network of Fig. the switch is closed of $t = 0$. With the capacitor uncharged, find value for i , at $t = 0^+$. 3

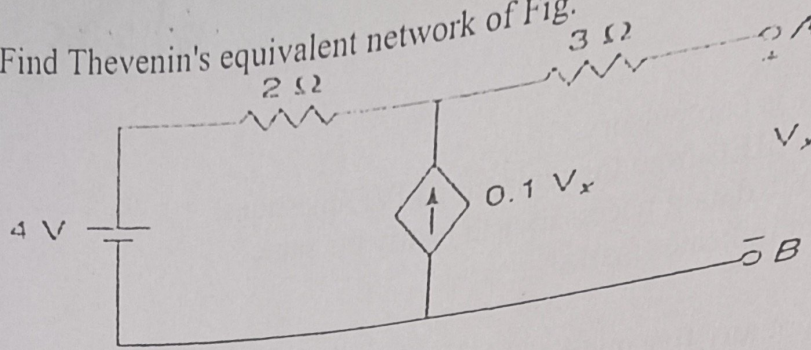


- (f) Evaluate Laplace Transform of Unit-Ramp Function and Sine function 3

- Q.2 (a) Given $f(t) = 3, 0 \leq t < 5, f(t) = 0, t > 5$ Find the $L[f(t)]$ and also $L[f'(t)]$ 4
- (b) In the network of Fig. , the switch is opened at $t = 0$. Find $i(t)$.
In the network of Fig. , the switch is opened at $t = 0$. Find $i(t)$. 5



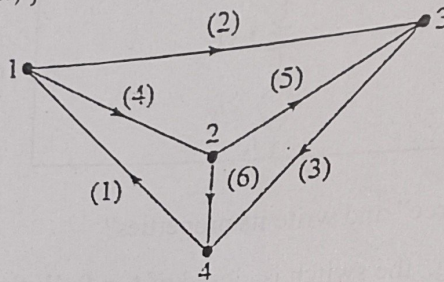
(c) Find Thevenin's equivalent network of Fig.



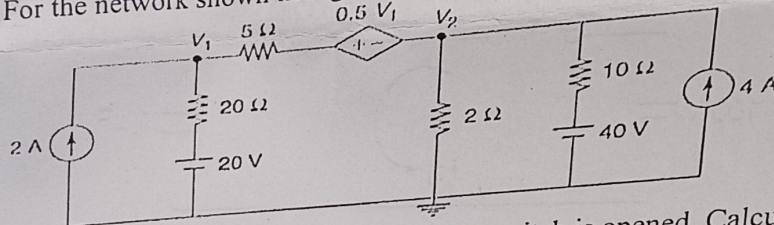
Q.3 (a) Determine the constants a, b, c, d if $f(z) = (x^2 + 2axy + by^2) + i(cx^2 + 2dxy + y^2)$ is analytic.

(b) Find The Inverse Laplace Transforms Of $\frac{3s+1}{(s+1)(s^2+2)}$

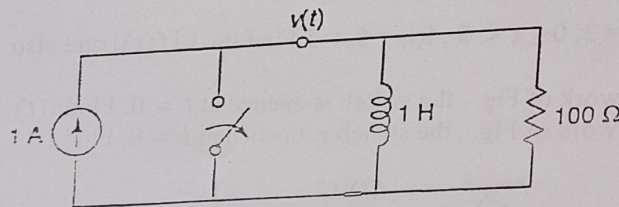
(c) The graph of a network is shown in Fig. 7.30. Write the (i) incidence matrix, (ii) f-cutset matrix.



Q.4 (a) For the network shown in Fig. find voltages V_1 and V_2 .

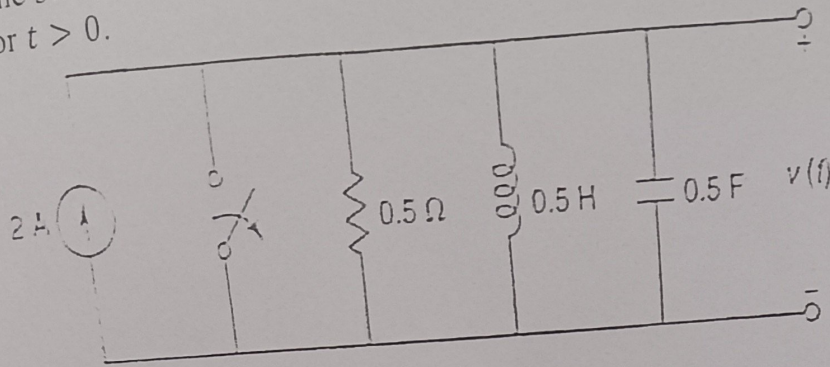


(b) In the network shown in Fig. at $t = 0$, the switch is opened. Calculate v , $\frac{dv}{dt}$ and $\frac{d^2v}{dt^2}$ at $t = 0^+$.

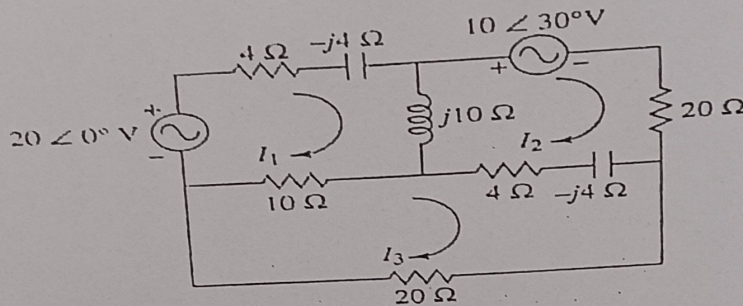


(c) Find the Laplace transforms of $\text{cosht} \int_0^t e^u \text{cosh} u \, du$

- (a) The switch in Fig. is opened at time $t = 0$. Determine the voltage $v(t)$ for $t > 0$. 4



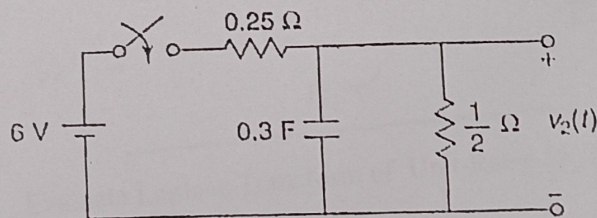
- (b) Find the value of the current I_3 in the network shown in Fig. 5



- (c) Find the analytic function whose imaginary part is $e^{-x}(y \sin y + x \cos y)$ 6

- Q.6 (a) Construct an analytic function whose real part is $x^4 - 6x^2y^2 + y^4$ 4

- (b) In the network of Fig. the switch is open for a long time and at $t = 0$, it is closed. Determine $v_2(t)$. 5



- (c) Draw the dual of the network of Fig. 6

