04-06-2026 SE ELECTRICAL SEM-III (NEP-2020) EMEC QP CODE: 20009938

(2 Hours) **Total Marks: 60**

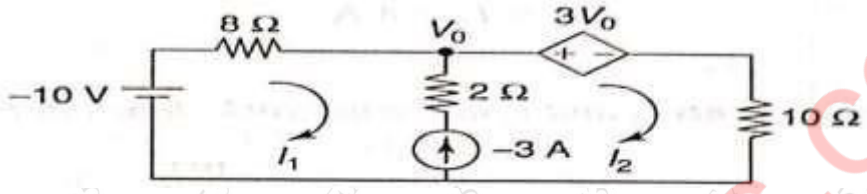
Note: **1. Question No. 1 is compulsory.**
2. Answer any THREE from the remaining FIVE questions.
3. Assume suitable data if necessary and justify the same.
4. Figure to right indicates marks

Q.1 Attempt any five questions [compulsory problem]

(a) Find the Laplace Transform of $e^{2t} + 4t^3$-sin2t.cos3t **3**

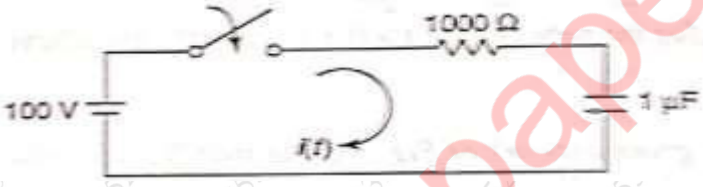
(b) Determine the constants a,b,c,d if **3**
f(z) =$(x^2 + 2axy + by^2)$+i$(cx^2 + 2dxy + y^2)$is analytic.

(c) In the network of following Fig. find currents I_1 and I_2. **3**



(d) Define the term "Loop" and write its properties? **3**

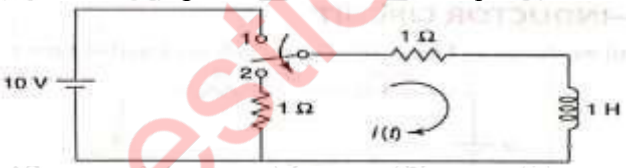
(e) In the network of Fig. the switch is closed of $t = 0$. With the capacitor uncharged, find value for i,at $t = 0^+$. **3**



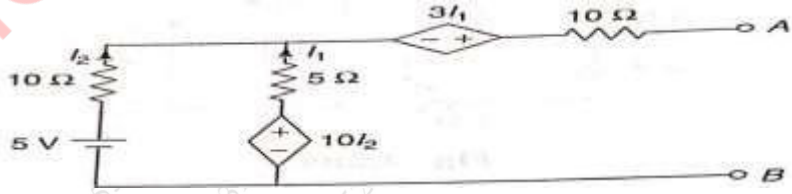
(f) Define Unit step Function and find its Laplace Transform. **3**

Q.2 **(a)** Find L$(e^{-3t}cosh5t.sin4t)$ **4**

(b) In the network of Fig, the switch is moved from the position 1 to 2 at $t = 0$, steady-state condition having been established in the position 1. Determine $i(t)$ for $t > 0$. **5**



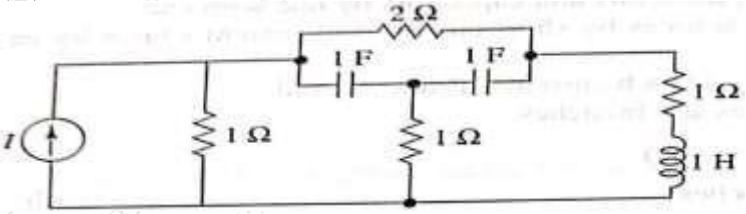
(c) Find Norton's equivalent network across terminals A and B of Fig. **6**



Q.3 **(a)** Construct an analytic function whose real part $e^x cosy$ **4**

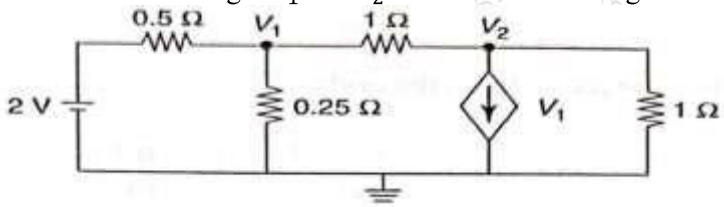
(b) Find The Inverse Laplace Transforms Of $\frac{s+29}{(s+4)(s^2+9)}$ **5**

(c) For the circuit shown in Fig. (i) draw its graph, (ii) draw its tree, and (iii) write the fundamental cutset matrix. **6**

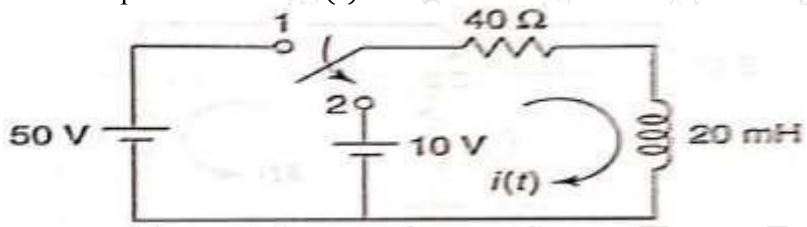


X525Y553B3EX525Y553B3EX525Y553B3EX525Y553B3E

Q.4 **(a)** Determine the voltages V_1 and V_2 in the network of Fig. **4**

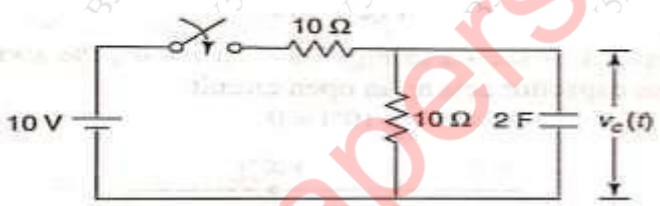


(b) The network of Fig. is under steady state with switch at the portion I. At $t = 0$, switch is moved to position 2. Find $i(t)$. **5**

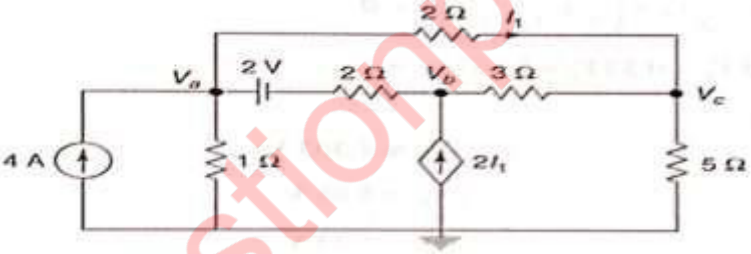


(c) Find the Laplace Transforms Of $\int_0^t ue^{-3u}cos^2 2u\, du$ **6**

Q.5 **(a)** The switch in the network shown in Fig. is closed at $t = 0$. Determine the voltage cross the capacitor. **4**



(b) Find voltages V_a, V_b and V_c in the network shown in Fig. **5**

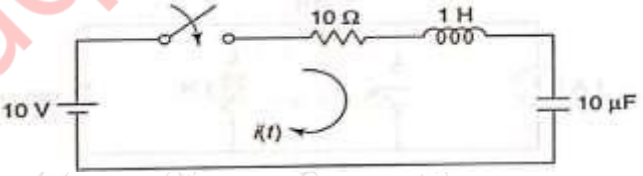


(c) Find the analytic function whose imaginary part is **6**

$$(x^4 - 6x^2y^2 + y^4) + (x^2 - y^2) + 2xy$$

Q.6 **(a)** Find k such that $\frac{1}{2}\log(x^2 + y^2) + i\frac{kx}{y}$ is analytic. **4**

(b) In the network shown in Fig. the switch is closed. Assuming all initial conditions as zero, find $i, \frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. **5**



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



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X525Y553B3EX525Y553B3EX525Y553B3EX525Y553B3E