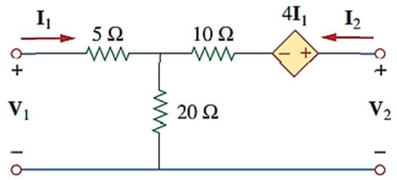
OR iii. Find $f(t)$ given that- **7**

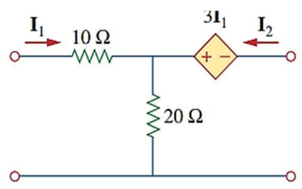
$$F(s) = \frac{s^2 + 12}{s(s+2)(s+3)}$$

Q.5 i. Derive expression for the Transmission parameters in terms of Z parameters for a two-port network. **4**

ii. Compute the z parameters of the circuit as shown below- **6**



OR iii. Find the transmission parameters for the two-port network as shown below- **6**



Q.6 Attempt any two:

i. Synthesize the Foster I and II forms of realization of the R-C driving-point function. **5**

$$Z_D(s) = \frac{2s^2 + 12s + 16}{s^2 + 4s + 3}$$

ii. Synthesize first and second Foster and Cauer forms of the LC driving-point impedance function. **5**

$$Z_D(s) = \frac{(s^2+1)(s^2+16)}{s(s^2+4)}$$

iii. Determine the Foster first form and Cauer second form after synthesizing the R-L driving-point impedance function. **5**

$$Z(s) = \frac{2(s+1)(s+3)}{(s+2)(s+4)}$$

******

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2022

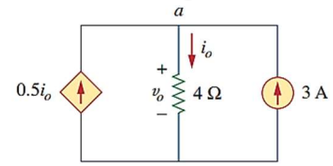
EC3CO05 Circuit Analysis & Synthesis

Programme: B.Tech. Branch/Specialisation: EC

Duration: 3 Hrs. **Maximum Marks: 60**

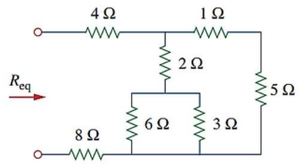
Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. The current i_0 in the circuit of the figure shown below- **1**



(a) 8A (b) 10A (c) 6A (d) 12A

ii. R_{eq} for the circuit of the figure shown below is- **1**



(a) $R_{eq} = 18.3\ \Omega$ (b) $R_{eq} = 17.3\ \Omega$

(c) $R_{eq} = 10.2\ \Omega$ (d) $R_{eq} = 14.4\ \Omega$

iii. The Thevenin resistance at terminals a and b of the circuit as shown in **figure 1** is- **1**

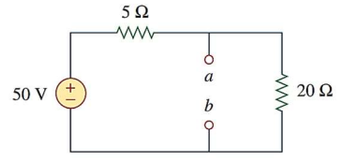


Figure 1

(a) $R_{Th} = 25\ \Omega$ (b) $R_{Th} = 15\Omega$

(c) $R_{Th} = 20\ \Omega$ (d) $R_{Th} = 4\Omega$

iv. The Thevenin voltage at terminals a and b of the circuit as shown in **figure 1** is- **1**

(a) $V_{Th} = 50\text{V}$ (b) $V_{Th} = 40\text{V}$

(c) $V_{Th} = 20\text{V}$ (d) $V_{Th} = 10\text{V}$

P.T.O.

v. The impedance of a 10-F capacitor is- **1**

(a) $^{10}/_{s}$ (b) $^{s}/_{10}$ (c) $^{1}/_{10s}$ (d) $10s$

vi. If the input to a linear system is $\delta(t)$ and the output is $e^{-2t}\,u(t)$ the transfer function of the system is- **1**

(a) $\frac{1}{s+2}$ (b) $\frac{1}{s-2}$ (c) $\frac{s}{s+2}$ (d) $\frac{s}{s-2}$

vii. Which of the following equations is called the state equation? **1**

(a) $\dot{x} = Ax + Bz$ (b) $y = Cx + Dz$

(c) $H(s) = Y(s) / Z(s)$ (d) $H(s) = C(sI - A)^{-1}B$

viii. For the single-element two-port network in Figure is- **1**

(a) 0 (b) 5 (c) 10 (d) Undefined

ix. A system with unity feedback having open loop transfer function as- **1**

$$G(s) = \frac{K(s+1)}{s^3+as^2+2s+1}$$

What values of 'K' and 'a' should be chosen so that the system oscillates?

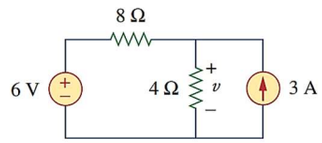
(a) $K = 2, a = 1$ (b) $K = 2, a = 0.75$

(c) $K = 4, a = 1$ (d) $K = 4, a = 0.75$

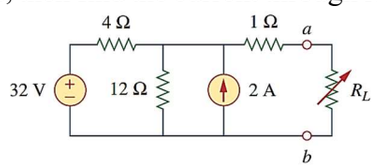
x. The polynomial $s^4 + Ks^3 + s^2 + s + 1 = 0$ the range of K for stability is- **1**

(a) $K > 5$ (b) $-10 < K$ (c) $K > -4$ (d) $K - 1 > 0$

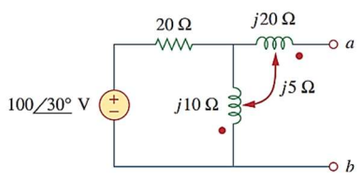
Q.2 i. Use the superposition theorem to find v of the circuit shown below- **2**



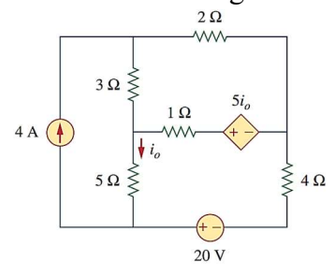
ii. Find the Thevenin equivalent circuit of the circuit shown below to the left of the terminals, then find the current through R_L, assume $R_L = 6\Omega$ **3**



iii. Find the Norton equivalent for the circuit shown below at terminals a – b **5**



OR iv. Find i_0 in the circuit as shown in the Figure 6 using superposition. **5**



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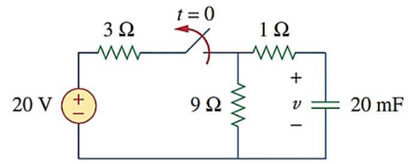
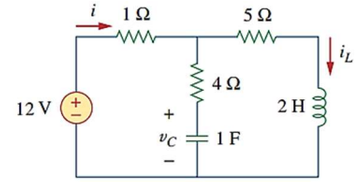
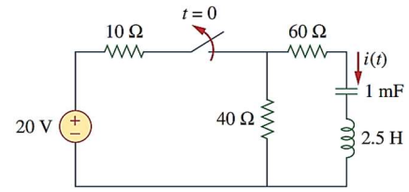


ii. Consider the circuit shown below, under dc conditions, find: (a) i , v_C and i_L, and (b) the energy stored in the capacitor and inductor. **8**



OR iii. Find $i(t)$ for $t > 0$ in the circuit shown below- **8**



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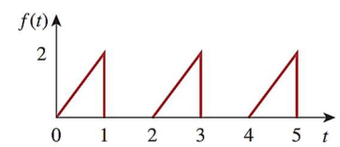
ii. Calculate the Laplace transform of the periodic function in the figure shown below- **7**



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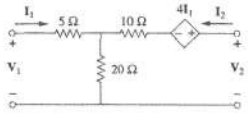

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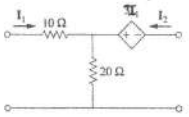

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Faculty of Engineering

End Sem (Odd) Examination Dec-2022

EC3CO05 Circuit Analysis & Synthesis

Programme: B.Tech. Branch/Specialisation: EC

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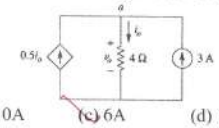

(a) 8A (b) 10A (c) 6A (d) 12A

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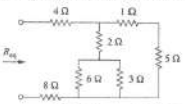

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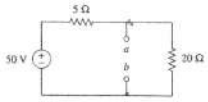

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vi. If the input to a linear system is $\delta(t)$ and the output is $e^{-2t}\,u(t)$ the transfer function of the system is- 1

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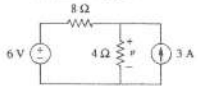

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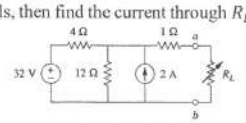

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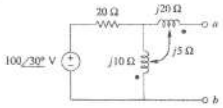

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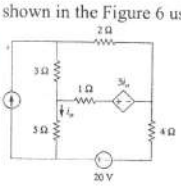

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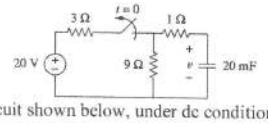

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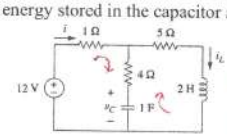

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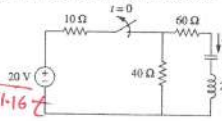

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