

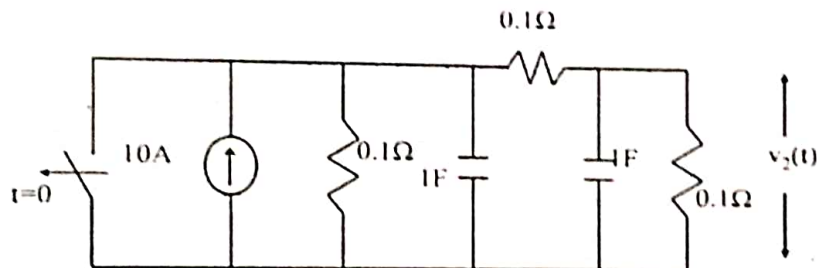
NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section. Use of scientific calculator is allowed.
x-x-x

Q1. Answer the following:-

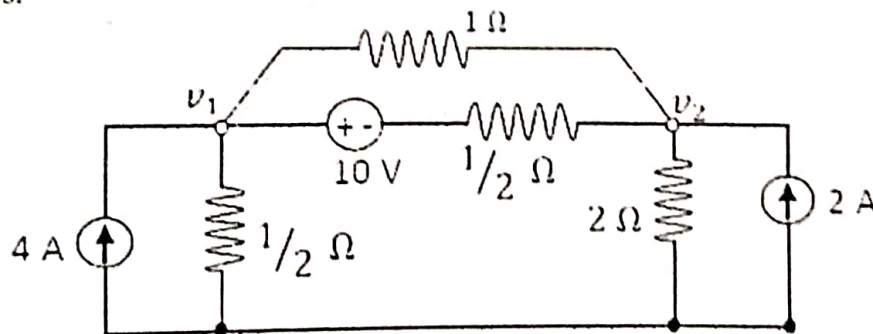
- At what condition an inductor can be considered as linear device? (2)
- Why RC timers are better choice than RL timers? (2)
- How can a voltage source be replaced by a current source? (2)
- What are the differences between super mesh and super node? (2)
- A DC source of 1V is suddenly applied to a series R-L-C circuit with $R = 2\Omega$, $L = 1H$ and $C = \frac{1}{2}$ (2)
- Sketch the current response $i(t)$ of the circuit. (2)

SECTION A

- Q2. (a) Find $v_2(t)$ by applying Norton's theorem. Assume that capacitors are initially uncharged. (5)



- (b) Find the power loss in the resistors of the network shown below using nodal analysis. (5)



- Q3. (a) A voltage source $V = 100 \sin(300t + 30^\circ)$ is applied to a network containing two elements in series. The resulting current is $I = 20 \sin(300t - 30^\circ)$ amps. Determine the values of the two elements. (5)
- (b) The current transfer function is given by (5)

$$I(s) = \frac{5s+3}{(s^2+2)(s^2+2s+2)}$$

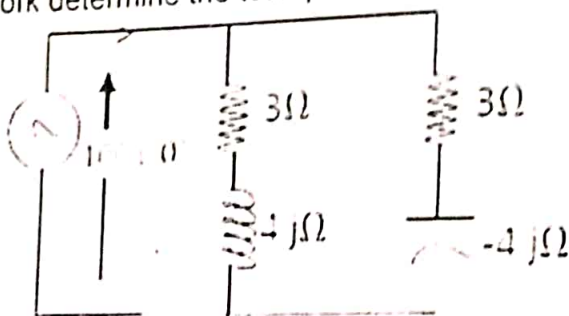
Obtain its time domain response.

(2)

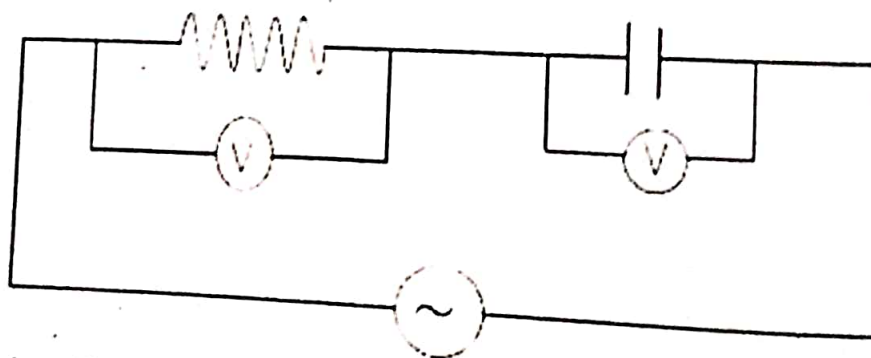
- Q4. (a) Design a constant K low pass filter of T-type with a cut off frequency of 2 KHz with a load resistance termination of 500 ohms. (5)
- (b) A 3 phase induction motor has a starting torque of 150% and maximum torque of 250% of full load torque. Neglect stator resistance and assume constant rotor resistance. Compute (a) Slip at maximum torque (b) Full load slip. (5)

SECTION B

- Q5. (a) In the following network determine the total power supplied by the source. (5)



- (b) Express the Z parameters of a two port network in terms of Y parameters. (5)
- Q6. (a) Design a constant K low pass filter of T-type with a cut off frequency of 2 KHz with a load resistance termination of 500 ohms. (5)
- (b) Determine the source voltage and phase angle when the voltage across the resistor is 20 V and the capacitor 30 V. (5)



- Q7. (a) Describe the effect of varying the excitation on the armature current and power factor of a synchronous motor, when input power to the motor is maintained constant. (5)
- (b) What is meant by hunting in a synchronous motor? Why is it undesirable? What is done to minimize it? (5)