

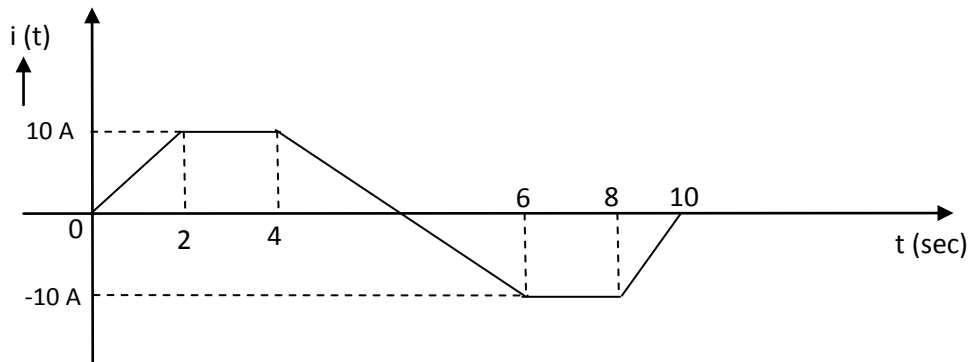
NETWORK ANALYSIS
(Common to ECE, EIE, E.Con.E and ECC)

Time: 3 hours

Max Marks: 80

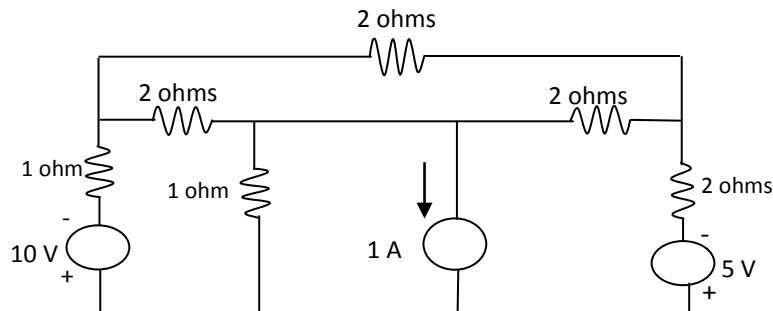
Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain active elements in detail.
(b) A pure inductance of 3 mH carries a current of the wave form shown in figure. Sketch the waveform of $V(t)$ and $P(t)$. Determine the average value of power.



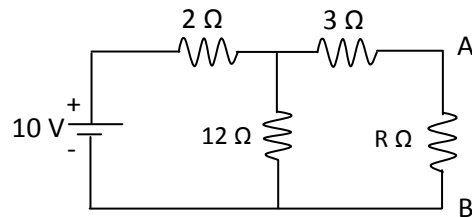
- 2 (a) Define and explain self – inductance and mutual – inductance.
(b) Two coupled coils of $L_1 = 0.8$ H and $L_2 = 0.2$ H have a coupling coefficient $k = 0.9$. Find the mutual inductance M . Derive the expression used.
- 3 (a) Show that the resonant frequency ω_0 of an RLC series circuit is the geometric mean of ω_1 and ω_2 , the lower and upper half power frequencies respectively.
(b) Given a series RLC circuit with $R = 10$ ohms, $L = 1$ mH and $C = 1$ μ F is connected across a sinusoidal source of 20 V with variable frequency. Find:
(i) The resonant frequency. (ii) Q factor of the circuit at resonant frequency. (iii) Half power frequencies.

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For the above network, draw (i) Graph. (ii) Tree. (iii) Dual network and also write down the procedure to draw dual network.

- 5 (a) State and explain Tellegens theorem.
(b) When the load impedance R draws the maximum power? Find the maximum power delivered to the load by using maximum power transfer theorem for the given network.



- 6 (a) Derive the relation between Z and ABCD parameters in a two port network.
(b) Define and explain h-parameters of a two port network.
- 7 A 50 Hz, 400 V (peak value) sinusoidal voltage is applied at $t = 0$ to a series RL circuit having resistance 5 ohms and inductance 0.2 H. Obtain an expression for current at any Instant 't', Calculate the value of transient current 0.01 sec after switching ON.
- 8 (a) Write short notes on m-derived low pass filter.
(b) Design m-derived low pass filter having a cut of frequency of 1 KHz, resonant frequency of 1200 Hz and design impedance of 500 ohms.
