

III/SEM/ELECT/2015 (W)

CIRCUIT AND NETWORK THEORY

Sub Code-EET 301

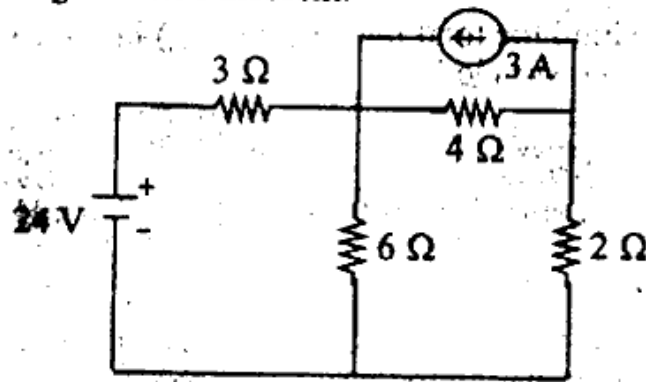
Full Marks : 70

Time : 3 hours

Answer any five questions

The figures in the right-hand margin indicate marks

- 1. (a) Express the given voltage $(5 + 3j)V$ to polar form. 2
- (b) Derive an expression for the resonance frequency of series RLC circuit. 5
- (c) Find the current through the 2Ω resistor using Norton's theorem. 7

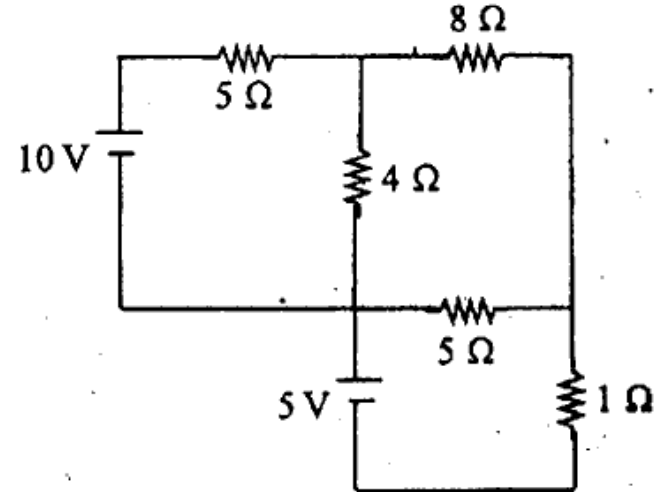


- 2. (a) What is the value of form factor for pure sinusoidal AC signal? 2

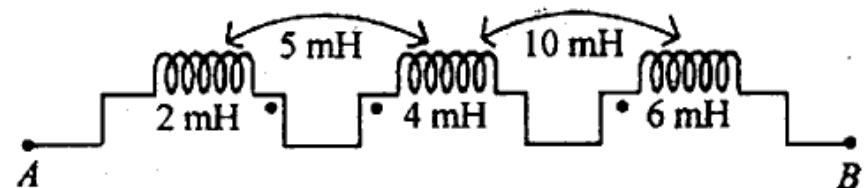
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(2)

- (b) State and explain Millman's theorem. 5
- (c) Find the current through 1Ω resistor applying the superposition theorem. 7

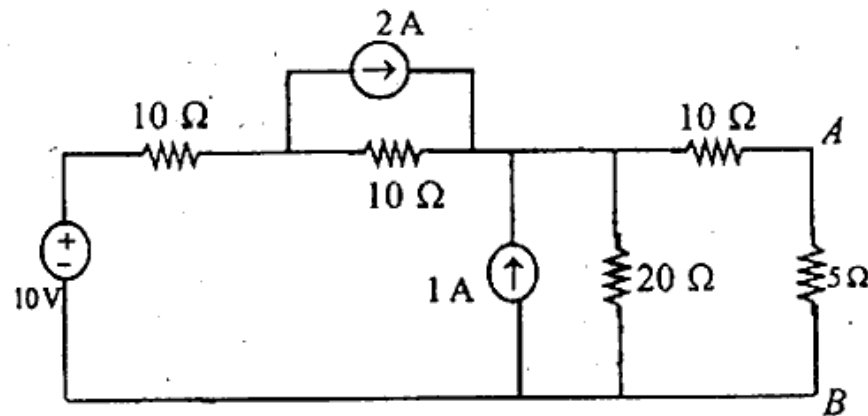


- 3. (a) What is active element and passive element? 2
- (b) Find the total inductance (L_{AB}) in the circuit shown below. 5

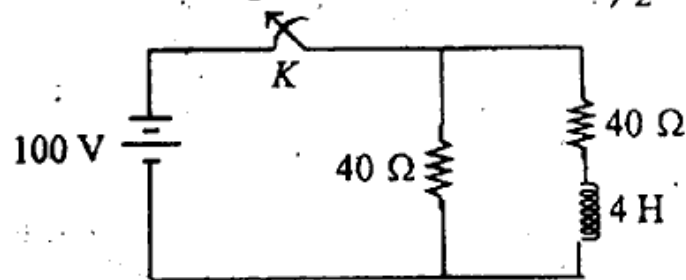


- (c) Find the Thevenin's equivalent circuit at terminal AB for the network shown in fig. and hence determine the power dissipated in a 5Ω resistor connected between A and B. 7

(3)



4. (a) What is co-efficient of coupling? 2
 (b) Explain hysteresis loop with diagram. 5
 (c) In fig. steady state condition is reached with 100 V d.c. source. At $t = 0$, switch K is suddenly opened. Find the expression of current through the inductor after $t = \frac{1}{2}$ sec. 7

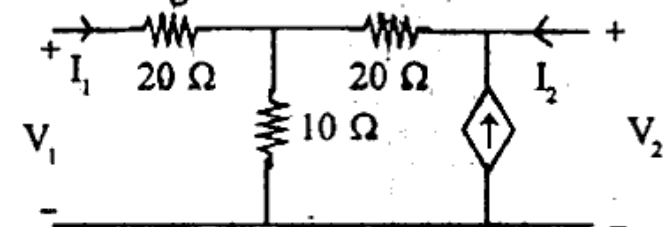


5. (a) What is resonance? 2
 (b) Explain the relation between line voltage and phase voltage, line current and phase current in star network. http://www.sctevtonline.com 5

(4)

(c) A circuit consisting of a coil of resistance 12Ω and inductance 0.15 H is series with a capacitor of $12 \mu\text{F}$ is connected to a variable frequency supply which has a constant voltage of 24 V calculate

- (i) The resonant frequency
 (ii) The current in the circuit at resonance
 (iii) The voltage across the capacitor and coil at resonance. 7
6. (a) What is two port network? 2
 (b) Derive the expression for z-parameter. 5
 (c) Determine the z-parameters of the network shown in fig. 7



7. (a) Draw the circuit constant k high pass filter. 2
 (b) A tank circuit consist of a 500 nF capacitor and a coil of resistance 50Ω and inductance 250 mH . Find frequency of resonance and Q-Factor. 5
 (c) Design k-type band pass filter having a design impedance of 500Ω and cut-off frequencies 1 kHz and 10 kHz . 7