

Reg. No. :

--	--	--	--	--	--	--	--	--	--

**Question Paper Code: 33504**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Third Semester

Electronics and Instrumentation Engineering

01UEI304 - ELECTRICAL CIRCUITS AND NETWORKS

(Common to Instrumentation and Control Engineering)

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

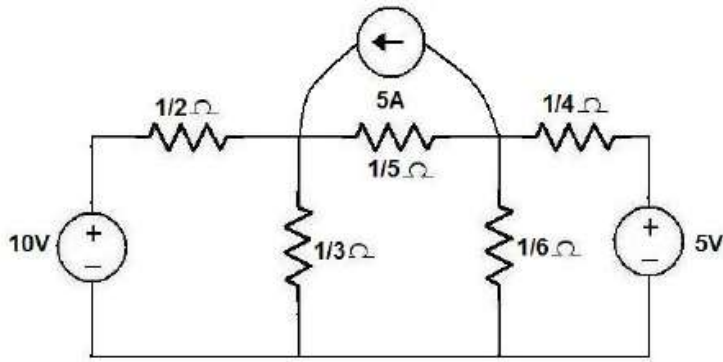
Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. State Ohm's law.
2. Give the advantages of sinusoidal alternating quantity.
3. Find the equivalent voltage source for a current source of 15A when connected in parallel with 5 ohm resistance.
4. Define Maximum power transfer theorem.
5. Define quality factor of a series resonant circuit.
6. Define coefficient of coupling.
7. What is meant by transient response?
8. State the time constant of the DC response of an  $RL$  circuit.
9. Define power and power factor.
10. A three phase balanced star connected load has 400V line to line voltage and 10A line current. Determine the line to neutral voltage and phase current.

PART - B (5 x 16 = 80 Marks)

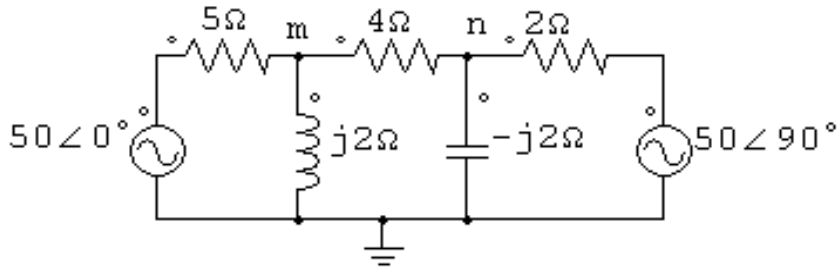
11. (a) (i) Using the node voltage analysis, find all the node voltages and currents in  $1/3$  ohm and  $1/5$  ohm resistances of figure. (10)



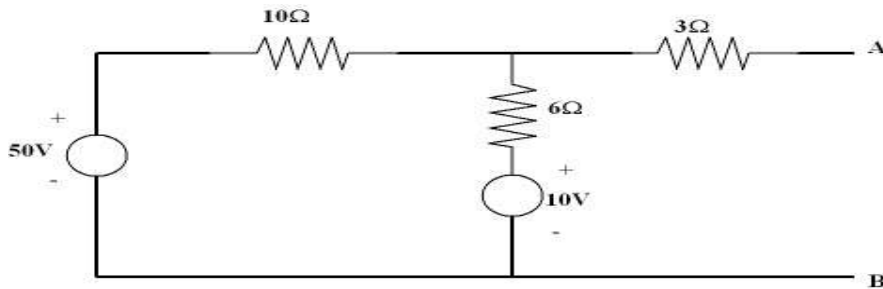
(ii) Discuss about voltage and current division principles. (6)

Or

(b) Using nodal voltage method, calculate the voltages of nodes 'm' and 'n' and currents through  $j2\Omega$  and  $-j2\Omega$  reactance in the network. (16)

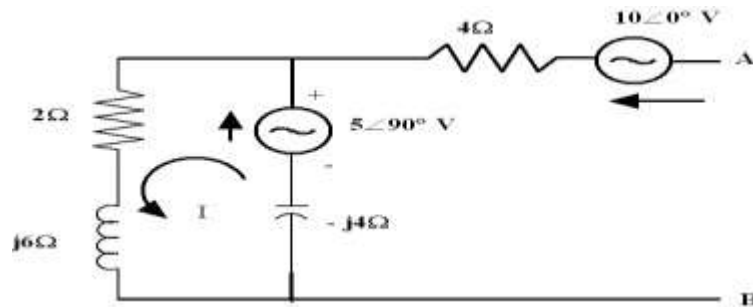


12. (a) Find Thevenin's equivalent circuit for the circuit shown below. (16)



Or

- (b) For the circuit shown below, determine Thevenin's equivalent circuit. (16)



- 13.(a) Describe the condition for resonance in a series RLC circuit and derive an expression for resonant frequency and frequency at which voltage across capacitor is maximum. Also draw the resonance curve and explain the values for the following parameters at resonance (i) phase angle (ii) current (iii) impedance (iv) admittance and (v) power factor. (16)

Or

- (b) (i) For the given circuit constants, find (i) Mutual Inductance (ii) Find equivalent inductance for all the combination  $L_1 = 0.02H$ ,  $L_2 = 0.01H$  and  $k = 0.5$ . (8)
- (ii) Calculate the mutual inductance of two coils of self - inductances  $100\mu H$  and  $240\mu H$ , which are connected in series to yield a total inductance of  $146\mu H$ . (8)
14. (a) A series RLC circuits has  $R = 50 \text{ ohm}$ ,  $L = 0.2H$ , and  $C = 50 \mu F$ . Constant voltage of  $100V$  is impressed upon the circuit at  $t = 0$ . Find the expression for the transient current assuming initially relaxed conditions. (16)

Or

- (b) Derive an expression for current response of RL and RC series circuit transients. (16)
15. (a) (i) Using phasor diagram, formulate the relationship between line current and phase current related to delta connected load. (8)
- (ii) A symmetrical 3 phase  $400V$  system supplies a balanced delta connected load. The current in each branch circuit is  $20A$  and phase angle  $40^\circ$  (lag). Calculate the line current, power factor and total power of the circuit. (8)

Or

- (b) (i) Explain about a balanced three phase system star connected load. (8)
- (ii) Explain about a unbalanced three phase system delta connected load. (8)