9. Derive the relation between Q-factor, BW and resonance frequency of a series resonating circuit.
10. State and explain Thevenin's theorem and Superposition theorem.
11. State Kirchhof's Current Law. Find the magnitude and direction of the unknown currents in fig.2. Given $i_1 = 10\ A, i_2 = 6\ A, i_5 = 4\ A.$
12. From the given network in fig. 3, draw its graph. Select a suitable tree and obtain the tie-set and cut-set matrix.

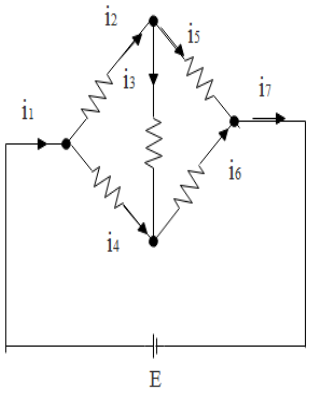

fig.2

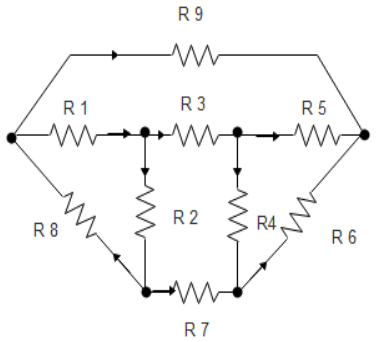

fig. 3

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SCHOOL OF ENGINEERING AND TECHNOLOGY

D.C. COURT JUNCTION, DIMAPUR

END TERM EXAMINATION JUNE 2017

Course Code:	EC3T01	**Semester:**	III	**TotalMarks**	60
Course Name:	**Network Theory (BP)**			**Time:**	3hrs.

Answer the following questions.

A. Choose the correct answer. (10x1=10)

i. In a cut set graph, number of branches are B=4, number of nodes are N=3. Number of links will be
   a) 4 (b) 3 (c) 2 (d) 1

ii. In an ac circuit, the current
   a) is always in-phase with the emf
   b) always leads the emf
   c) always lags the emf
   d) any of the above, depending upon the elements of the circuit

iii. An inductor stores energy in
   a) electrostatic field
   b) magnetic field
   c) electromagnetic field
   d) none of above

iv. A terminal where three or more branches meet is known as
   a) branch b) node c) loop d) circuit

v. The current through an inductance follows
   a) a linear growth
   b) a linear decay
   c) an exponential decay
   d) an exponential growth

vi. At t=0+ with zero initial condition, which of the following act as open circuit?
   a) inductor b) capacitor c) resistor d) all of the above

vii. The superposition theorem is applicable to
   a) current only
   b) voltage only
   c) both current and voltage
   d) current, voltage and power

viii. A capacitor is …….element
   a) passive and bilateral
   b) passive and unilateral
   c) active and bilateral
   d) active and unilateral

ix. At resonance, in series LCR circuit, which relation is not valid
   a) $\omega = \frac{1}{LC}$ (b) $\omega = \frac{1}{\sqrt{LC}}$ (c) $L\omega = \frac{1}{\omega C}$ (d) $\omega = \frac{1}{\omega L}$

x. Kirchhoff's law is applicable to
   a) ac circuits only c) ac as well as dc circuits
   b) dc circuits only d) passive network only

B. Answer any five questions. (5x4=20)

1. What are the properties of tree in a graph? Give the relation between twigs and links.
2. Define the following network graph theory terms
   branch; tree link; degree of node; tie-set.
3. What are the steps involve for solving a network using Norton theorem.
4. Give the properties of resonance of RLC series and parallel circuit.
5. A coil having an inductance and resistance of 50 mH and 100 ohms is connected in series with a capacitor and a 100 V, 1 kHz source. Calculate the value of capacitance that will cause resonance in the circuit and the circuit current at resonance frequency.
6. Write short note on resonance in electrical circuit and transient response of passive circuit.

C. Answer any four questions. (4x7.5=30)

7. A 220 V, 100 Hz ac source supplies a series LCR circuit with a capacitor and a coil. If the coil has 50 mΩ resistance and 5 mH inductance, find, at a resonance frequency of 100 Hz what is the value of capacitor? Also calculate the Q factor and half power frequencies of the circuit.
8. Develop nodal equation in nodes (1), (2) and (3) in the circuit given in fig.1

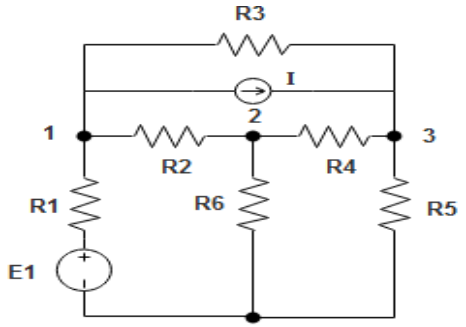

fig.1