Code No: R161208 **R16** SET - 1

I B. Tech II Semester Supplementary Examinations, Nov/Dec - 2017
ELECTRICAL CIRCUIT ANALYSIS – I
(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) What are dependent Sources and write their symbols. (2M)

   b) Draw a Graph for an electrical network. (2M)

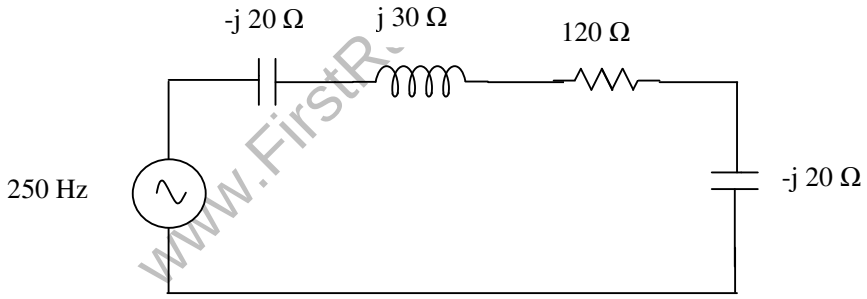
   c) Explain the concept of Mutual Inductance. (2M)

   d) Transform the following sinusoid into Phasor (2M)
   $I = 5\cos(\omega t - 75^0)$.

   e) What is resonance in an ac series circuit? (2M)

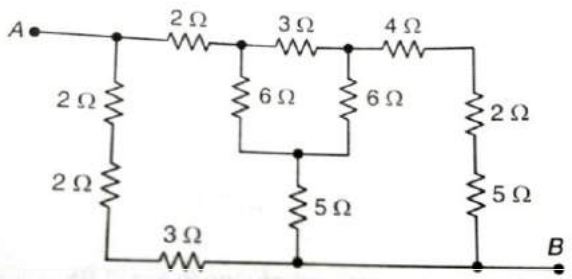
   f) State Reciprocity theorem. (2M)

   g) A series audio circuit is shown in below figure .What is the impedance of the circuit? (2M)



PART –B

2. a) Calculate the effective resistance between the points A and B in the circuit shown in below figure. (7M)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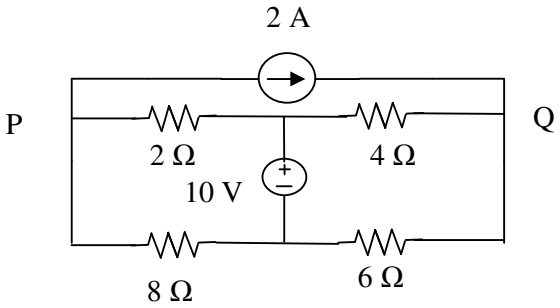
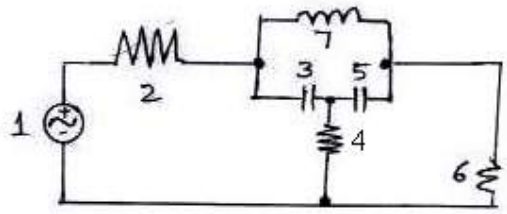
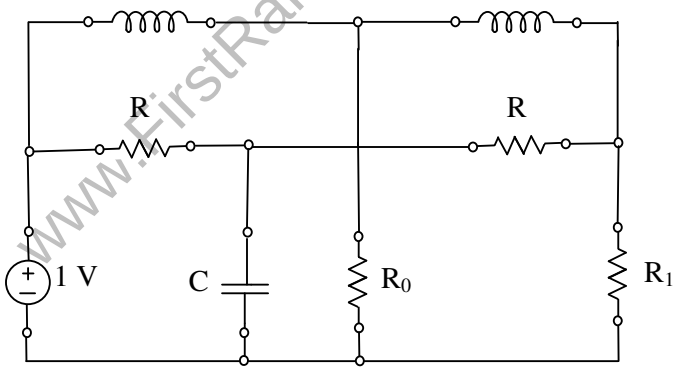
b) Using nodal analysis, determine the voltage between the points, P and Q shown in below figure. (7M)



3. a) Draw the graph of the network shown in below figure and write down the tie-set matrix. (7M)



b) Construct the dual of the network shown in below figure. (7M)



4. a) A magnetic circuit consists of an iron ring of mean circumference 90 cm with cross-sectional area of 10 cm^2 throughout. A current of 2.5 A in the magnetizing coil of 250 turns produce a total flux of 1.2 mwb in the iron. calculate: (7M)
(i) the flux density in the iron
(ii) the absolute and relative permeability of iron
(iii) the reluctance of the circuit.

b) Two coupled coils have self inductances L_1=10mH and L_2= 20mH. The coefficient of coupling (*K*) being 0.75 in the air, find voltage in the second coil and the flux of first coil provided the second coil has 500 turns and the circuit current is given by $i = 2\sin 314t$ A. (7M)

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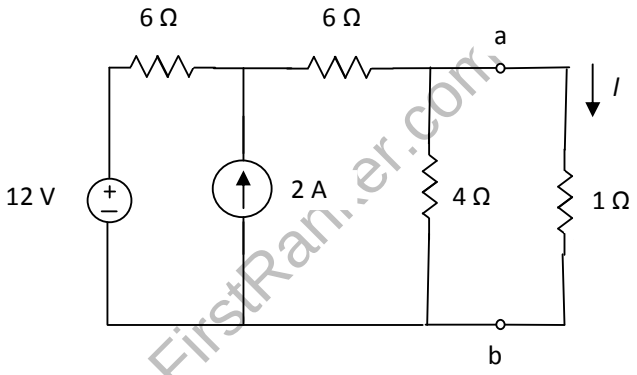
5. a) A variable frequency source of v = 200 volt is applied to a series RL circuit having R=10 Ω and L=10 mH. Draw Z-locus and I-locus considering sample frequencies ω=0,500,1000,2000 and 5000 rad/sec. (9M)

   b) If voltage υ = 20 sin (100t + 40˚) is applied to a 60 μF capacitor, calculate the current through the capacitor. (5M)

6. a) At resonance, the current is maximum in a series circuit and minimum in a parallel circuit. Why? (6M)

   b) A resistance of 12 Ω and an inductance of 0.025 H are connected in series across a 50Hz supply. What values of resistance and inductance when connected in parallel will have the same resultant impedance and pf ? Find the current in each case when the supply voltage is 230 V. (8M)

7. a) Using Norton's theorem, find the equivalent circuit to the left of the terminals in the circuit of below figure. Then find *I*. (7M)



   b) In the network shown in below figure, the 5 Ω resister is changed to 8 Ω . Determine the resulting change in current through the (3+j4) Ω impedance branch using compensation theorem. (7M)