R15

Code: 15A02201

B.Tech I Year II Semester (R15) Supplementary Examinations December 2018
**ELECTRICAL CIRCUITS – I**
(Electrical & Electronics Engineering)

Time: 3 hours   Max. Marks: 70

PART – A
(Compulsory Question)
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1   Answer the following: (10 X 02 = 20 Marks)
  (a)   Distinguish between dependent and independent voltage sources.
  (b)   State Kirchhoff's voltage and current laws.
  (c)   Define form factor. What is its value for a pure sinusoidal voltage?
  (d)   State the values of power factor for pure resistance, inductance and capacitance.
  (e)   Write the expression for resonant frequency of a series R-L-C circuit.
  (f)   What is Q factor? Write its significance.
 (g)   For the circuit shown in figure below, find the Thevenin's resistance, across AB.
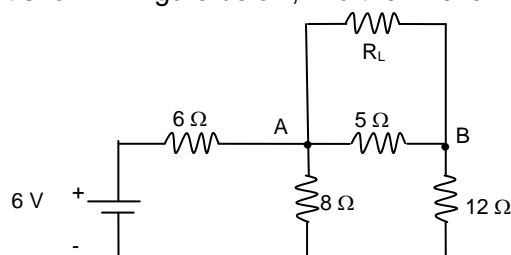
  (h)   State reciprocity theorem.
  (i)   List the parameters of a two port network.
  (j)   Write the expressions for Y-parameters in terms of Z=parameters.

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a) For the circuit shown in figure below, find the current flowing in all branches by applying Kirchhoff's laws.
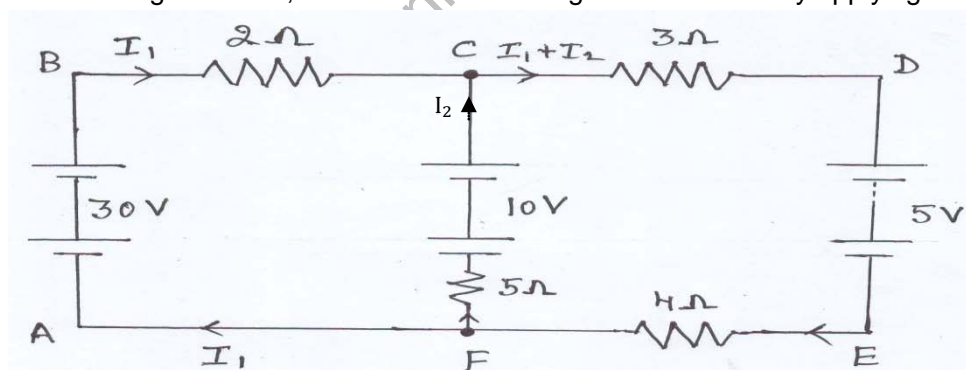
  (b)   Two coils connected in series have a resistance of 18Ω and when connected in parallel have a resistance of 4Ω. Find the value of resistances.

OR

3 (a) Derive an expression for energy stored in an inductor.
  (b)   Using source transformation technique, determine the load current in the circuit shown in figure below.

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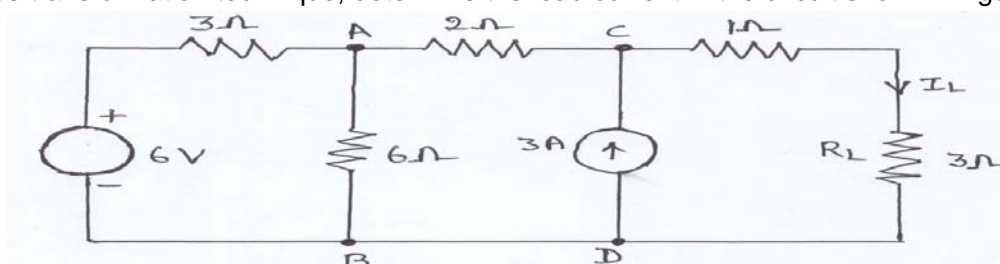
UNIT – II

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4 (a) Write short notes on R.M.S and average value for a periodic waveform.

   (b) Two impedances in an electrical network are given by $Z_1 = 4.7\angle35^o$ and $Z_2 = 7.36\angle48^o$. Determine in polar form the total impedance Z_T given that $Z_T = Z_1Z_2/(Z_1 + Z_2)$.

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OR

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5 For an R-L series circuit, the current $i = 14.14 \sin(157t)$, R = 5 ohms, L = 30mH. Determine: (i) Inductive reactance. (ii) Impedance. (iii) Total voltage. (iv) Power factor. (v) Real power and reactive power.

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UNIT – III

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6 For a series RLC circuit, R = 25 ohms, L = 10mH and C = 0.06 μF. Find the value of Bandwidth and Q factor. Derive the necessary expressions.

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OR

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7 (a) Draw the current laws of R-L series circuit with variable resistance with constant applied voltage and frequency, deriving necessary expressions.

   (b) Derive the expressions for maximum impedance is a practical parallel circuit.
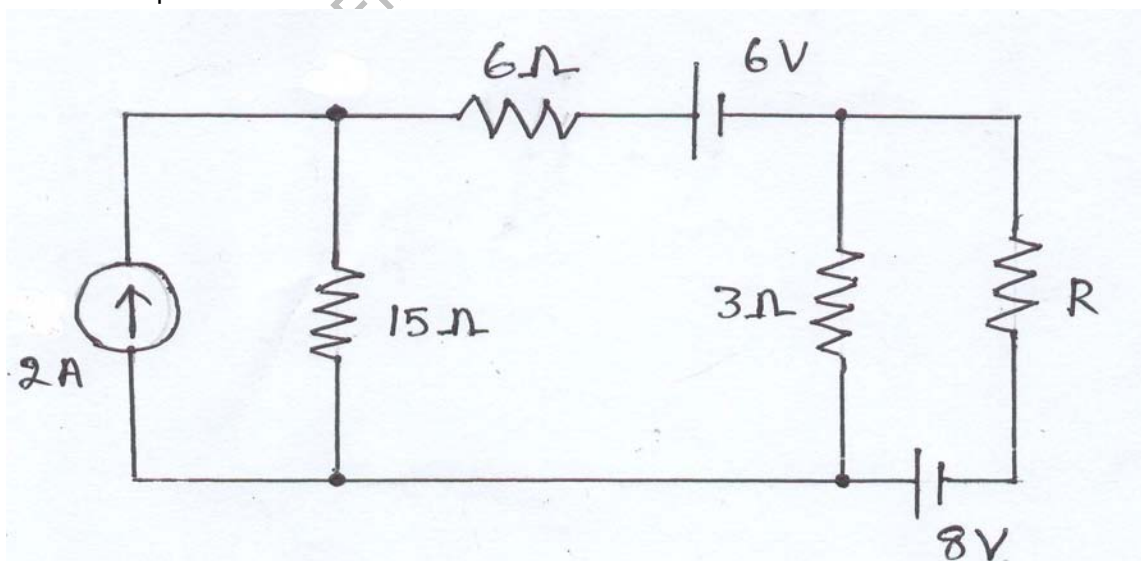
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UNIT – IV

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8 Determine the current in 4 ohm resistor for the circuit shown in figure below by using Thevenin's theorem and verify the result using Norton's theorem.

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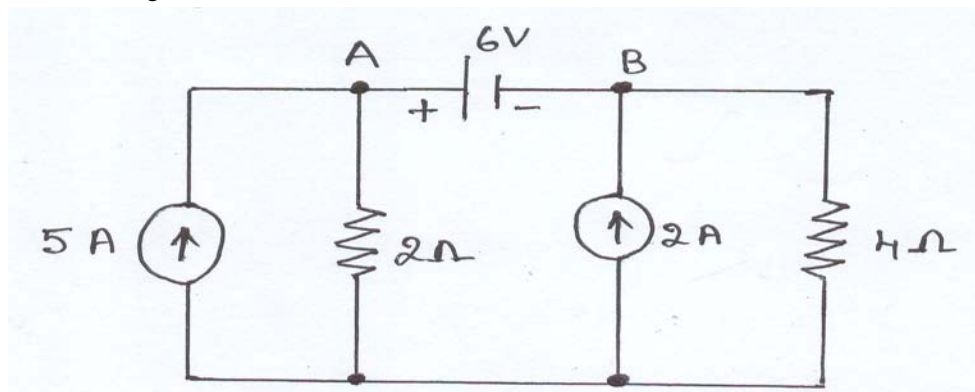
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9 Calculate the value of R which will absorb maximum power from the circuit of given below. Also find the value of maximum power.
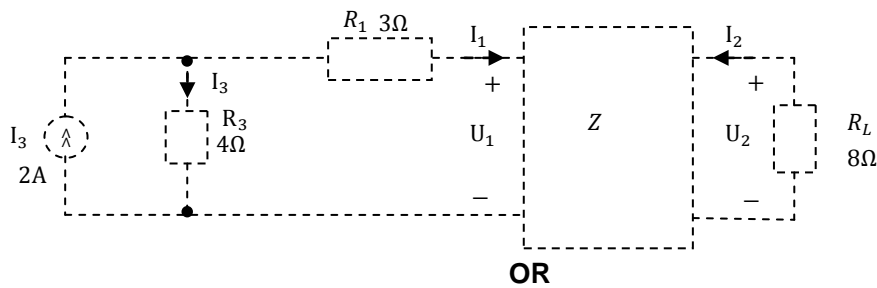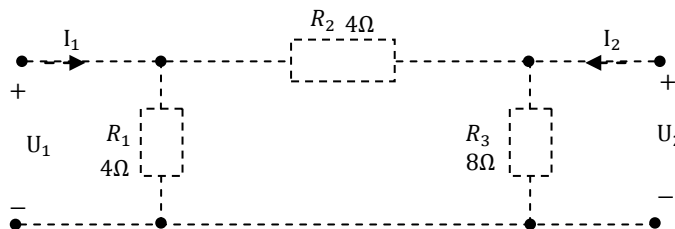
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UNIT – V

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10   Obtain the current and power of the load R_L, if the two port shown in the figure below is defined with its Z parameter: $Z = \begin{bmatrix} 8\Omega & -3\Omega \\ -4\Omega & 9\Omega \end{bmatrix}$.

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OR

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11   Obtain the hybrid parameters for the two port network shown in figure below.

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