SN – 239

I Semester B.Sc. Examination, November/December 2010
(Semester Scheme) (O.S) (2004 Onwards)
ELECTRONICS (Paper – I)
Electronic Fundamentals

Time : 3 Hours Max. Marks : 60

Instruction : *Answer **any five** questions from Part – **A**, **four** questions from Part – **B** and **five** subdivisions from Part – **C**.*

PART – A

Answer **any five** questions : **(5×6=30)**

1. a) Explain the construction and working of a carbon composition resistor.

   b) Derive an expression for the energy stored in an inductor.

2. a) With a diagram explain the working of dA'rsonval movement.

   b) Define an ideal voltage source. When does the practical voltage source behave like stiff voltage source ?

3. a) State and explain voltage divider and current divider theorem.

   b) With a suitable resistive network, explain the steps involved in the analysis of a dc circuit using note voltage method.

4. a) Define the terms, rms value and peak value of an alternating voltage.

   b) An alternating voltage is applied to a circuit having a capacitor C and a resistor R in series. Derive an expression for impedance and current in the circuit.

5. Derive an expression for the impedance of a series RLC circuit using phasor diagram. Draw and explain the impedance curve. What is the condition for the circuit to be at resonance ? Derive an expression for resonant frequency.

6. State and explain :
   a) Super position theorem
   b) Reciprocity theorem

7. a) State and explain Kirchhoff's current law.
   b) State and prove maximum power transfer theorem for an ac network.

8. a) Distinguish between Intrinsic semiconductor and Extrinsic semiconductor.
   b) Discuss the three approximations of a Pn junction diode with relevant equivalent circuit and V-I characteristics.

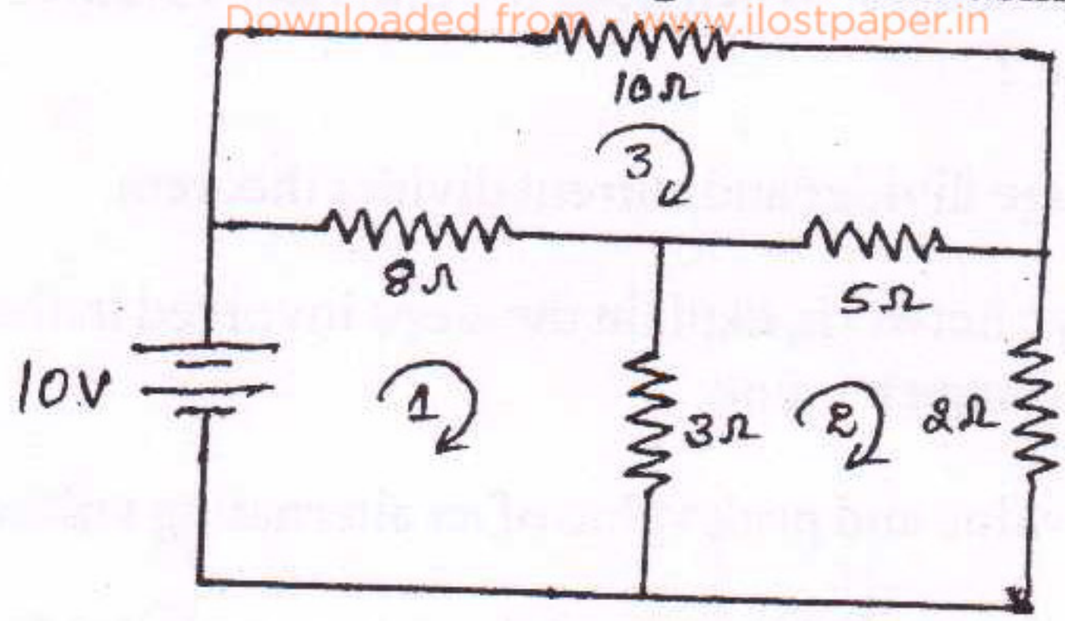
PART – B

Answer **any four** questions : **(4×5=20)**

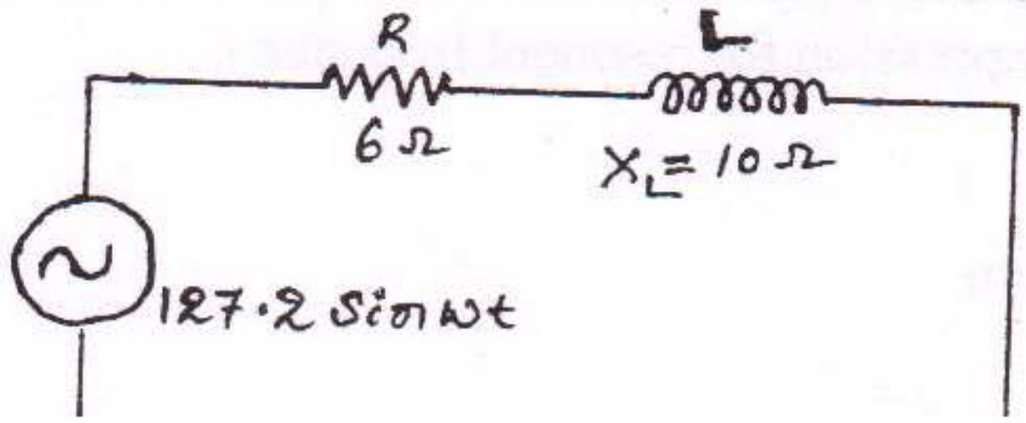
9. Two capacitors of capacitance 10 μF and 20 μF are connected in series with a battary of 100 V. Calculate :
   1) Effective capacitance
   2) Total charge
   3) The total energy.

10. A dc source of 100 V, a resistor of resistance 1 KΩ and inductor of inductance 5 H are connected in series, calculate the current after (i) 5 ms and (ii) 15 ms. Show the variation of current graphically.

11. Find the current through 3 Ω resistor in the given circuit using mesh current method.

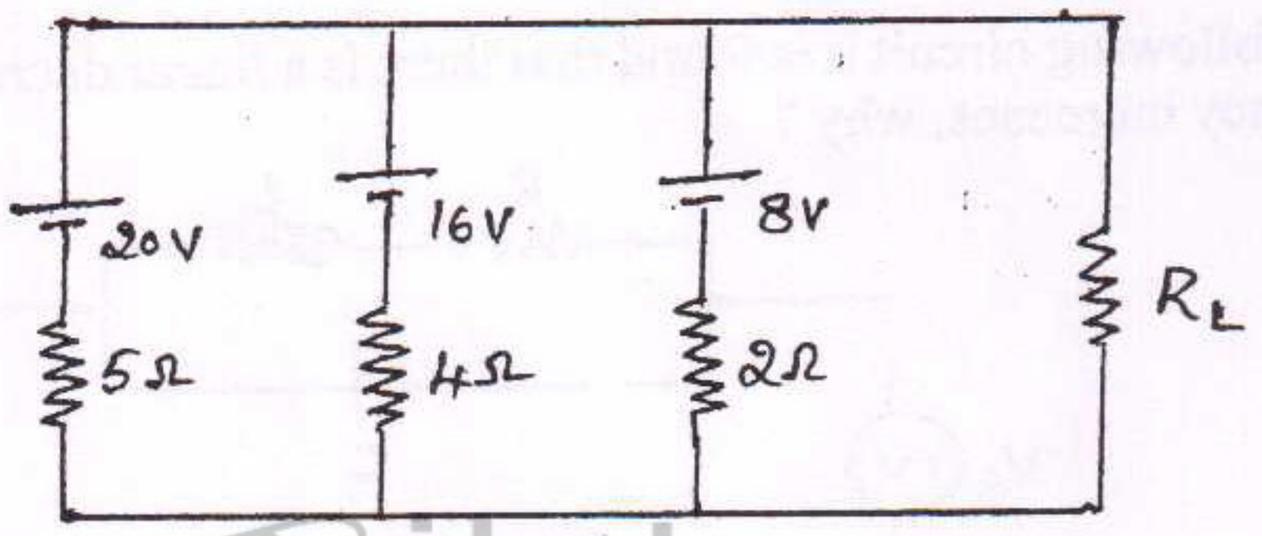


12. Calculate :
   i) Impedance
   ii) Voltage drop across R and
   iii) Voltage drop across L using phasor method. Calculate the power delivered to the circuit.



13. A parallel resonant circuit consists of R = 50Ω, L = 50 μH and C = 200 pF. Calculate the
    i) Resonant frequency
    ii) Impedance at resonance
    iii) Band width
    iv) Quality factor.

14. For the given network find the current through and voltage across the load R_L using Millman's theorem.

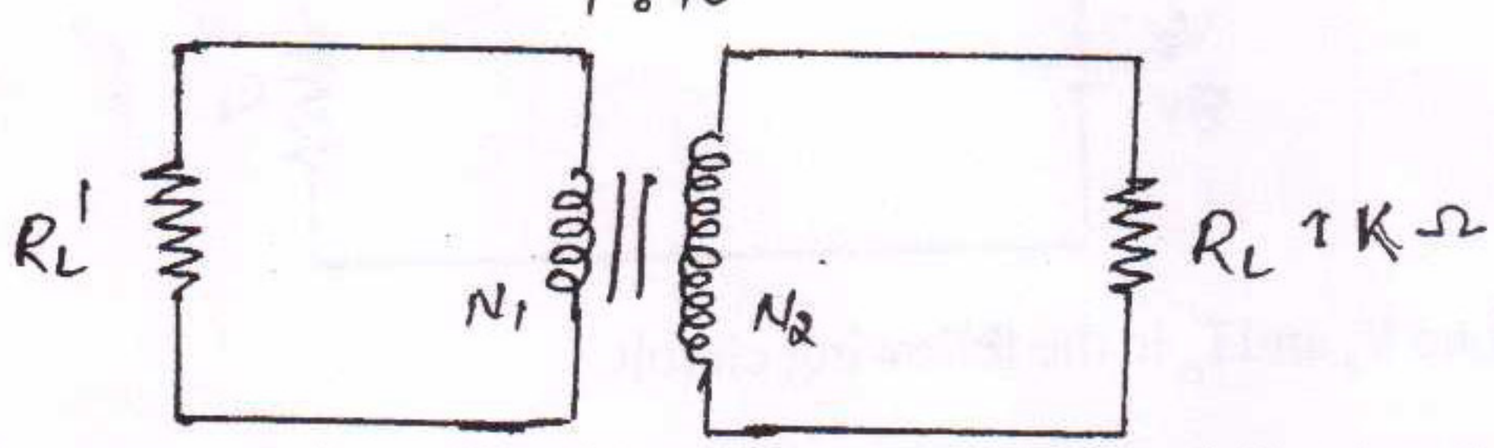


PART – C

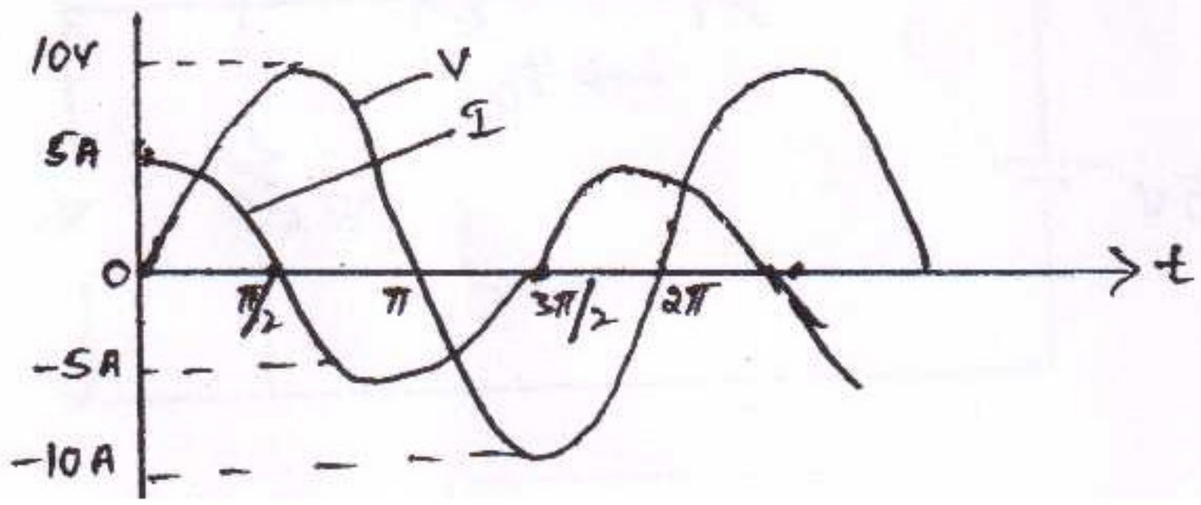
Answer **any five** subdivisions : **(5×2=10)**

15. a) Electrolytic capacitors must be connected with proper polarity. Why ?

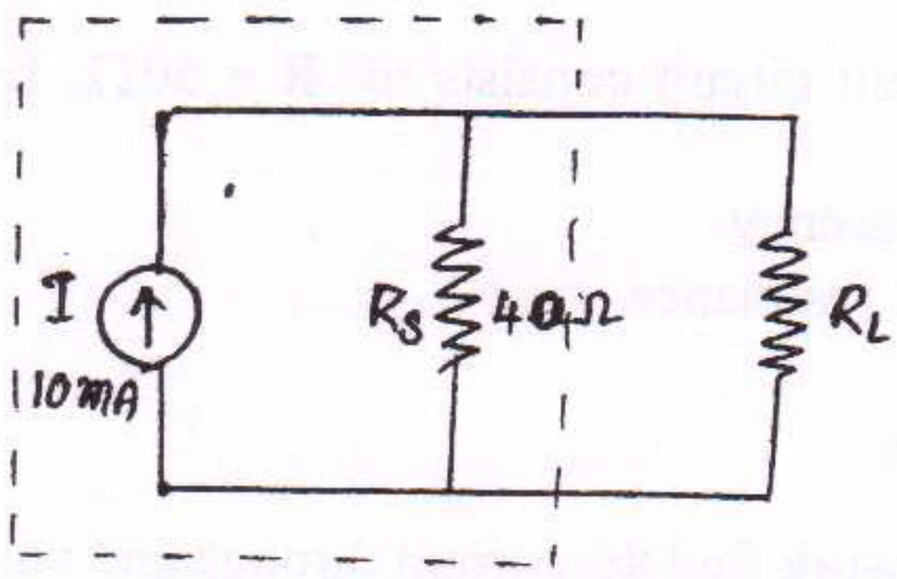
    b) What is the value of R_L^1 in the following circuit.



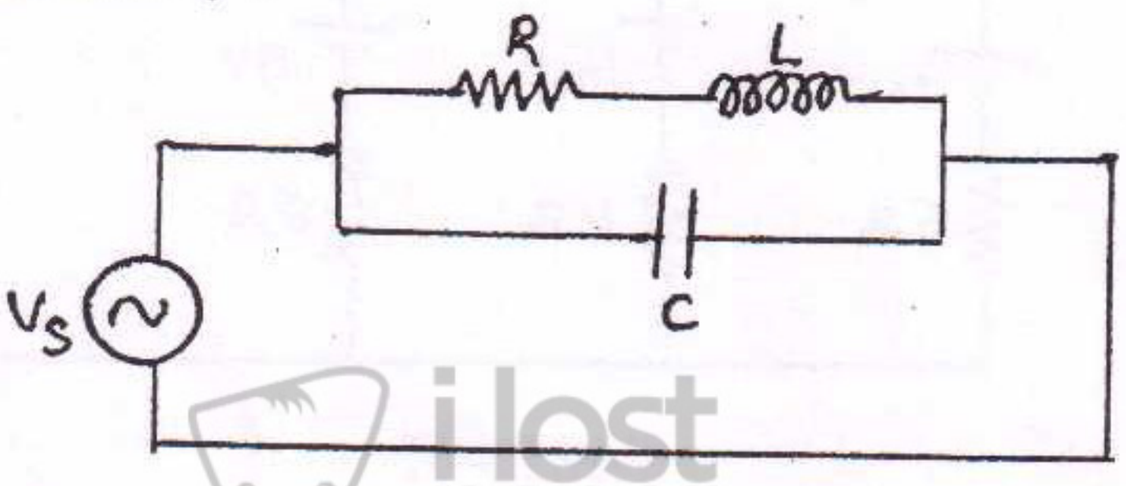
    c) The instantaneous voltage V and resulting current i through the circuit element are as shown :



d) Find the value of R_L necessary to transfer maximum power to R_L and calculate the power delivered to R_L.

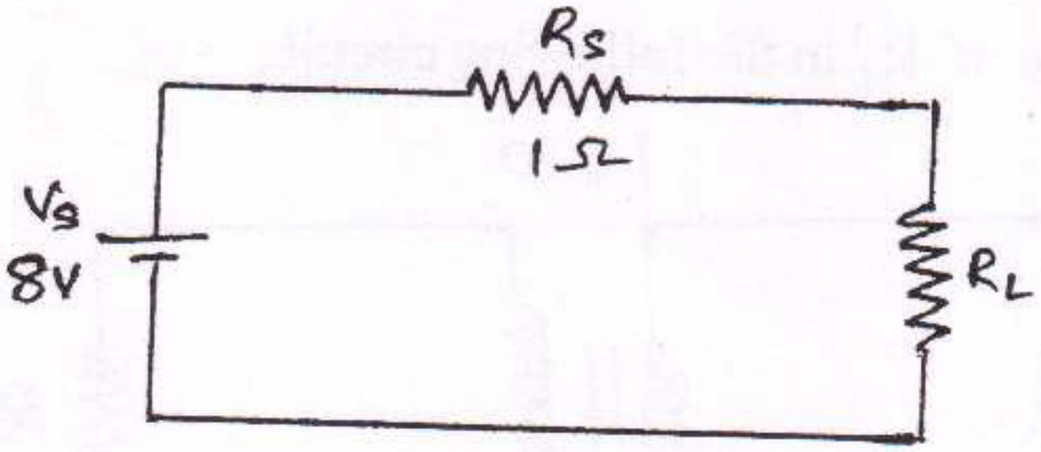


e) In the following circuit it is found that there is a linear decrease in the current as frequency increases, why ?



f) In the following circuit : 1) What is I_L when $R_L = 0$?

2) What is V_L when $R_L = \infty$?



g) Determine V_0 and I_D in the following circuit.