



## Part B

### Section : A

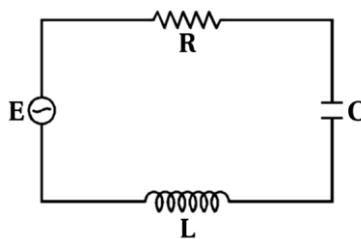
- Write any 03 (three) answers from the question no 1 to 5 given below. (Each carries 2 Marks) [06]
1. Derive equation of induced emf in the rod which is sliding on two sides of U shaped frame placed perpendicular to magnetic field.
  2. Obtain the resonant frequency  $\omega_r$  of a series LCR circuit with  $L = 2.0 \text{ H}$ ,  $C = 32 \mu\text{F}$  and  $R = 10 \Omega$ . What is the Q-value of this circuit ?
  3. Due to which reasons the energy losses do occurs in actual transformer ?
  4. An object is placed at 5 cm in front of a concave mirror of radius of curvature 15 cm. Find the position, nature, and magnification of the image in each case.
  5. Obtain the equivalent focal length of combination of thin lenses placed in contact.

### Section : B

- Write any 02 (two) answers from the question no 6 to 8 given below. (Each carries 3 Marks) [06]
6. Obtain the expression for the magnetic energy stored in a solenoid in terms of magnetic field B, area A and length  $l$  of the solenoid.
  7. Obtain an equation of current for AC voltage applied to an inductor and draw a graph of V and I.
  8. (i) If  $f = 0.5 \text{ m}$  for a glass lens, what is the power of the lens ?  
(ii) The radii of curvature of the faces of a double convex lens are 10 cm and 15 cm. Its focal length is 12 cm. What is the refractive index of glass ?  
(iii) A convex lens has 20 cm focal length in air. What is focal length in water ?  
(Refractive index of air-water = 1.33, refractive index for air-glass = 1.5.)

### Section : C

- Write any 01 (one) answer from the question no 9 and 10 given below. (Each carries 4 Marks) [04]
9. Figure shows a series LCR circuit connected to a variable frequency 230 V source.  $L = 5.0 \text{ H}$ ,  $C = 80 \mu\text{F}$ ,  $R = 40 \Omega$ .



- (a) Determine the source frequency which drives the circuit in resonance.
  - (b) Obtain the impedance of the circuit and the amplitude of current at the resonating frequency.
  - (c) Determine the rms potential drops across the three elements of the circuit.
10. Obtain the relation between incidence angle, emergence angle, prism angle and deviation angle for refraction through prism.

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