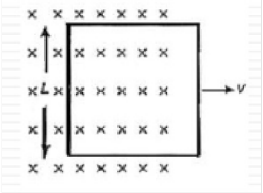
INDIAN SCHOOL DARSAIT
DEPARTMENT OF PHYSICS

Subject : Physics	Topic : EMI and AC	Date of Worksheet : 18.8.19
Resource Person: Susan Anil		Objective type question
Name of the Student :_____	Class & Div : XII____	Roll No : __

1) A conducting square loop of side L and resistance R moves in its plane with a uniform velocity 'v' perpendicular to one of its sides. A magnetic induction B constant in time and space, pointing perpendicular and into the plane at the loop exists everywhere with half the loop outside the field, as shown in the figure:



The induced e.m.f. is

a) zero
b) RvB
c) vBL/R
d) vBL

2) A boat is moving due east in a region, where the earth's magnetic field is 5×10^{-5}T due north and horizontal. The boat carries a vertical aerial 2m long. If the speed of the boat is 1.5m/s, the magnitude of the induced e.m.f. in the aerial is

a) 1mV
b) 0.75mV
c) 0.5mV
d) 0.15mV

3) A metal conductor of length 1m rotates vertically about one of its end at angular velocity 5rad/s. If the horizontal component of the earth's magnetic field is 0.2×10^{-4}T, then e.m.f. developed between the ends of the conductor is

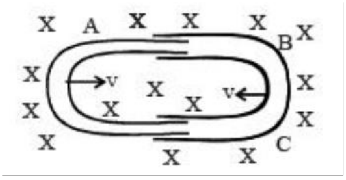
a) 5μV
b) 50μV
c) 5mV
d) 50mV

4) In a uniform magnetic field of induction B, a wire in the form of semicircle of radius 'r' rotates about the diameter of the circle with angular frequency 'ω'. If the total resistance of the circuit is 'R', the mean power generated per period of rotation is

a) $\frac{B\pi r^2\omega}{2R}$
b) $\frac{(B\pi r^2\omega)^2}{8R}$

c) $\frac{(B\pi r\omega)^2}{2R}$ d) $\frac{(B\pi r\omega^2)^2}{8R}$

5) One conducting U-tube can slide inside another as shown in figure maintaining electrical contacts between the tubes. The magnetic field is perpendicular to the plane of the figure.



If each tube moves towards the other at a constant speed 'v', then the e.m.f. induced in the circuit in terms of B,l and v, where l is the width of each tube, will be

a) Blv b) -Blv

c) zero d) 2BLv

6) A magnetic field of $2x10^{-2}$T acts at right angles to a coil of area 100cm^2 with 50 turns. The average e.m.f. induced in the coil is 0.1V, when it is removed from the field in time 't'. The value of 't' is

a) 0.1s b) 0.01s

c) 1s d) 10s

7) A metal ring is held horizontally and bar magnet is dropped through the ring with its length along the axis of the ring. The acceleration of the falling magnet is

a) Equal to g b) Less than g

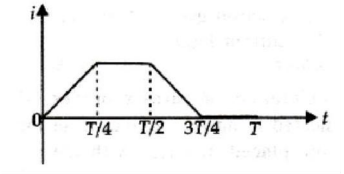
c) More than g d) Either (a) or (c)

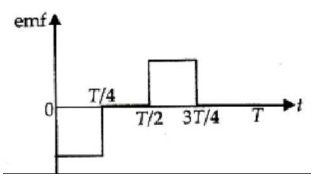
8) An inductor may store energy in

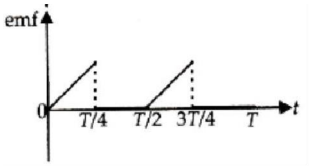
a) Its electric field b) Its coil

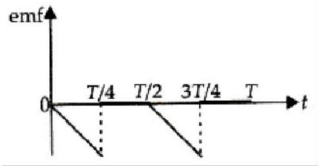
c) Its magnetic field d) Both in electric and magnetic fields

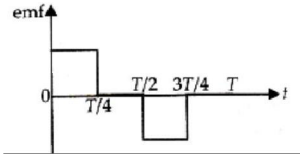
9) The current I in a coil varies with time as shown:



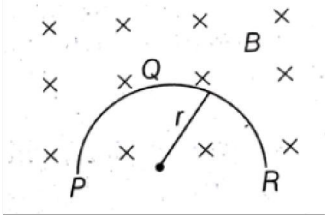
a) 

b) 

c) 

d) 

10) A thin semicircular conducting ring of radius 'r' is falling with its plane vertical in a horizontal magnetic induction B as shown in the figure.



The speed of the ring is 'v'. The potential difference developed across the ring is

a) zero
b) ½ BvR^2
c) πRBv
d) 2RBv

11) The phase difference between the alternating current and emf is π/2. Which of the following cannot be the constituent of the circuit?

a) C alone
b) L alone
c) L,C
d) R,L

12) In an LCR circuit, the voltage across each of the components L,C and R is 50V. The voltage across the LC-combination will be:

a) 50V
b) $50\sqrt{2}$
c) 100V
d) Zero

13) In an LCR circuit, capacitance is changed from C to 2C. For the resonant frequency to remain unchanged, the inductance should be changed from L to:

a) 4L
b) 2L
c) L/2
d) L/4

14) In a series LCR circuit, R=200Ω and the voltage and the frequency of the main supply is 220V and 50Hz respectively. On taking out the capacitor from the circuit, the current lags behind the voltage by 30^0. On taking out the inductor from the circuit, the current leads voltage by 30^0. The power dissipated in the LCR circuit is

a) zero
b) 210W
c) 242W
d) 305W

15) In an oscillating LC circuit, the maximum charge on the capacitor is Q. The charge on the capacitor, when the energy is stored equally between the electric and magnetic field is:

a) Q/2 b) $Q/\sqrt{3}$

c) $Q/\sqrt{2}$ d) Q

16) In an AC circuit, the voltage applied is $E=E_o\sin\omega t$. The resulting current in the circuit is $I=I_o\sin(\omega t-\pi/2)$. The power consumption in the circuit will be:

a) $E_0I_o/2$ b) $E_0I_o/\sqrt{2}$

c) $\sqrt{2}\,E_0I_o$ d) 0

17) The reactance of a capacitor of capacitance C is X. If both the frequency and capacitance be doubled, then new reactance will be:

a) X b) 2X

c) 4X d) X/4

18) An ac voltage is applied to a resistance R and an inductor L in series. If R and inductive reactance are both equal to 3Ω,the phase difference between the applied voltage and the current in the circuit is:

a) $\pi/6$ b) $\pi/4$
c) $\pi/2$ d) 0

19) A transformer is used to light a 100W-110V lamp from a 220V mains. If the main current is 0.5A, the efficiency of the transformer is approximately:

a) 10% b) 30%

c) 50% d) 90%

20) A step up transformer operates on a 230V line and supplies a current of 2A. The ratio of primary and secondary windings is 1:25. The primary current is

a) 12.5A b) 50A

c) 8.8A d) 25A