

## Topic :-Electro Magnetic Induction

- An transformer is employed to reduce 220 V to 11 V. The primary draws a current of 5 A and the secondary 90 A. The efficiency of the transformer is
  - 20%
  - 40%
  - 70%
  - 90%
- Which of the following phenomena is utilised in the construction of mouth piece of a telephone now a days?
  - Thermo electric effect
  - Photo electric effect
  - Change of resistance with pressure
  - Electromagnetic induction
- Two circuits have coefficient of mutual induction of 0.09 henry. Average e.m.f. induced in the secondary by a change of current from 0 to 20 ampere in 0.006 second in the primary will be
  - 120 V
  - 80 V
  - 200 V
  - 300 V
- The particle accelerator that uses the phenomenon of electromagnetic induction is the
  - Cyclotron
  - Betatron
  - Van de Graff generator
  - Cockroft- Walton generator
- At a place the value of horizontal component of the earth's magnetic field  $H$  is  $3 \times 10^{-5}$  weber/ $m^2$ . A metallic rod  $AB$  of length 2 m placed in east-west direction, having the end  $A$  towards east, falls vertically downward with a constant velocity of 50 m/s. Which end of the rod becomes positively charged and what is the value of induced potential difference between the two ends
  - End A,  $3 \times 10^{-3}$  mV
  - End A, 3 mV
  - End B,  $3 \times 10^{-3}$  mV
  - End B, 3 mV
- The number of turns in the coil of an ac generator is 5000 and the area of the coil is  $0.25 m^2$ . The coil is rotated at the rate of 100 cycles/sec in a magnetic field of  $0.2 W/m^2$ . The peak value of the emf generated is nearly
  - 786 kV
  - 440 kV
  - 220 kV
  - 157.1 kV
- A rectangular loop of sides 10 cm and 5 cm with a cut is stationary between the pole pieces of an electromagnet. The magnetic field of the magnet is normal to the loop. The current feeding the electromagnet is reduced so that the field decreased from its initial value of 0.3 T at the rate of  $0.02 \Omega$ . If the cut is joined and the loop has a resistance of  $2.0 \Omega$ , the power dissipated by the loop as heat is
  - 5 nW
  - 4 nW
  - 3 nW
  - 2 nW

8. An axle of truck is 2.5 m long. If the truck is moving due north at  $30 \text{ ms}^{-1}$  at a place where the vertical component of the earth's magnetic field is  $90 \mu\text{T}$ , the potential difference between the two ends of the axle is
- a) 6.75 mV with west end positive                      b) 6.75 mV with east end positive  
c) 6.75 mV with north end positive                      d) 6.75 mV with south end positive
9. A square loop of side 22 cm is converted into circular loop in 0.4s. A uniform magnetic field of 0.2 T directed normal to the loop then the *emf* induced in the loop is
- a)  $6.6 \times 10^{-3} \text{ V}$                       b)  $6.6 \times 10^{-5} \text{ V}$                       c)  $4.6 \times 10^{-4} \text{ V}$                       d)  $4.60 \times 10^{-8} \text{ V}$
10. A conducting rod of length  $l$  is falling with a velocity  $v$  perpendicular to a uniform horizontal magnetic field  $B$ . The potential difference between its two ends will be
- a)  $2Blv$                       b)  $Blv$                       c)  $\frac{1}{2}Blv$                       d)  $B^2l^2v^2$
11. Two pure inductors each of self inductance  $L$  are connected in parallel but are well separated from each other. The total inductance is
- a)  $2L$                       b)  $L$                       c)  $\frac{L}{2}$                       d)  $\frac{L}{4}$
12. A physicist works in a laboratory where the magnetic field is  $2T$ . She wears a necklace enclosing area  $0.01\text{m}^2$  in such a way that the plane of the necklace is normal to the field and is having a resistance  $R = 0.01 \Omega$ . Because of power failure, the field decays to  $1T$  in time  $10^{-3}$  seconds. Then what is the total heat produced in her necklace? ( $T = \text{tesla}$ )
- a) 10 J                      b) 20 J                      c) 30 J                      d) 40 J
13. A coil has 1,000 turns and  $500 \text{ cm}^2$  as its area. The plane of the coil is placed at right angles to a magnetic induction field of  $2 \times 10^{-5} \text{ Wbm}^{-2}$ . The coil is rotated through  $180^\circ$  in 0.2 s. the average emf induced in the coil, in mV, is
- a) 5                      b) 10                      c) 15                      d) 20
14. A coil having 500 turns of square shape each of side 10 cm is placed normal to magnetic field which is increasing at  $1 \text{ Ts}^{-1}$ . The induced emf is
- a) 0.1 V                      b) 0.5 V                      c) 1 V                      d) -5 V
15. The current in a  $LR$  circuit builds up to  $3/4^{\text{th}}$  of its steady state value in 4s. The time constant of this circuit is
- a)  $\frac{1}{\ln 2} \text{ s}$                       b)  $\frac{2}{\ln 2} \text{ s}$                       c)  $\frac{3}{\ln 2} \text{ s}$                       d)  $\frac{4}{\ln 2} \text{ s}$
16. A 50 Hz ac current of peak value 2 A flows through one of the pair of coils. If the mutual inductance between the pair of coils is 150 mH, then the peak value of voltage induced in the second coil is
- a)  $30 \pi \text{ V}$                       b)  $60 \pi \text{ V}$                       c)  $15 \pi \text{ V}$                       d)  $300 \pi \text{ V}$
17. An air core solenoid has 1000 turns and is one metre long. Its cross-sectional area is  $10 \text{ cm}^2$ . Its self inductance is
- a) 0.1256 mH                      b) 12.56 mH                      c) 1.256 mH                      d) 125.6 mH
18. The magnetic induction in the region between the pole faces of an electromagnet is  $0.7 \text{ weber/m}^2$ . The induced e.m.f. in a straight conductor 10 cm long, perpendicular to  $B$  and moving perpendicular both to magnetic induction and its own length with a velocity  $2 \text{ m/sec}$  is
- a) 0.08 V                      b) 0.14 V                      c) 0.35 V                      d) 0.07 V

19. Quantity that remains unchanged in a transformer is  
a) Voltage                      b) Current                      c) Frequency                      d) None of these
20. Which of the following is not an application of eddy currents  
a) Induction furnace                      b) Galvanometer damping  
c) Speedometer of automobiles                      d) X-ray crystallography

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