

XII - En: 4, 5

Class: XII

Mark: 70

Date: 21.12.2020

Physics

Time: 2.00 hrs

Part - A

I) Choose the correct answer:

15 x 1 = 15

- 1) The SI unit of energy is -----
 a) watt (W) b) joule (J) c) henry (H) d) ohm (Ω)
- 2) The value of millihenry (mH) -----
 a) $4\pi \times 10^{-7} \frac{H}{m}$ b) 2.718 c) $10^{-3} H$ d) $10^{-6} W$
- 3) The flux linked with a coil at any instant t is given by $\phi_B = 10t^2 - 50t + 250$. The induced emf at $t = 3s$
 a) -190V b) -10V c) 10V d) 190V
- 4) $\frac{20}{\pi^2} H$ inductor is connected to a capacitor of capacitance C . The value of C in order to impart maximum power at 50 Hz is
 a) 50 μF b) 0.5 μF c) 500 μF d) 5 μF
- 5) When an current changes from +2A to -2A in 0.05s an emf of 8V is induced in a coil. The co-efficient of self induction of the coil is
 a) 0.2 H b) 0.4 H c) 0.8 H (d) 0.1 H
- 6) Choose the odd one out
 a) Hysteresis loss b) copper loss c) Flux loss
 d) power loss

- 7) In AC generator the brushes are made of
 a) silicon b) Plastic c) carbon d) nylon
- 8) A transformer
 a) converts energy b) change voltage c) change current
 d) changes both current and voltage
- 9) If the magnetic monopole exists then which of the Maxwell's equation to be modified?
 a) $\oint_S \vec{E} \cdot d\vec{A} = \frac{q_{\text{enclosed}}}{\epsilon_0}$ b) $\oint_S \vec{B} \cdot d\vec{A} = 0$
 c) $\oint_S \vec{B} \cdot d\vec{l} = \mu_0 i_c + \mu_0 \epsilon_0 \frac{d}{dt} \oint_S \vec{E} \cdot d\vec{A}$ d) $\oint_L \vec{E} \cdot d\vec{l} = -\frac{d}{dt} \oint_S \vec{B} \cdot d\vec{A}$
- 10) Which of the following is an electromagnetic wave?
 a) α rays b) β rays c) γ rays d) all of these
- 11) The dimension of $\frac{1}{\mu_0 \epsilon_0}$ is
 a) $[L T^{-1}]$ b) $[L^2 T^{-2}]$ c) $[L^{-1} T]$ d) $[L^{-2} T^{-1}]$
- 12) If $\lambda_v, \lambda_x, \lambda_m$ represents the wavelength of visible light X-rays and microwaves respectively
 a) $\lambda_m > \lambda_x > \lambda_v$ b) $\lambda_v > \lambda_m > \lambda_x$ c) $\lambda_m > \lambda_v > \lambda_x$
 d) $\lambda_v > \lambda_x > \lambda_m$
- 13) The frequency range of radio-wave is
 (a) 3×10^7 to 3×10^{14} Hz
 b) 3×10^{17} to 3×10^{14} Hz
 c) 3×10^9 to 3×10^4 Hz
 d) 3×10^{17} to 3×10^4 Hz

- 14) which is correct pair
- a) Gamma rays - structure of crystals
 - b) X-rays - structure of nucleus
 - c) U-V rays - structure of atoms
 - d) Microwaves - Radar (RADAR) communication system
- 15) which is used in forensic labs
- a) X-rays b) UV-rays c) γ (Gamma) rays d) visible

Part - B

- 16) Answer any 6 questions Q.no: 19 compulsory $6 \times 2 = 12$
- 16) what is displacement current?
- 17) why are e.m waves non-mechanical
- 18) what are Fraunhofer lines? How are they useful in the identification of element present in sun?
- 19) name the parts of Electromagnetic spectrum which is
- (i) used to destroy bacteria
 - (ii) produced by sudden deceleration of high speed electrons
 - (iii) used in food industry
- 20) write uses of Infrared radiation
- 21) state Lenz's law
- 22) what are Phasors
- 23) Application of Eddy currents
- 24) How will you define Q-factor?

Part-c

III) Answer any 6 questions & no: 33 compulsory $6 \times 3 = 18$

- 25) Give the uses of Foucault current (any 1)
- 26) Advantages and disadvantages of AC over DC
- 27) Determine the self inductance of 4000 turn air-core solenoid of length 2m and diameter 0.04m
- 28) In an AC circuit $R = 4\Omega$, $Z = 5\Omega$, $V_{rms} = 200V$ and $I_{rms} = 1.5A$. calculate the average power consumed over a full cycle.
- 29) Define magnetic flux
- 30) write down the integral form of modified Ampere's Circuital law
- 31) Any 3 properties of Electromagnetic waves
- 32) which part of the electromagnetic spectrum is used in operating a RADAR and why?
- 33) The oscillating magnetic field in a Plane electromagnetic wave is given by

$$B_y = (8 \times 10^{-6}) \sin(2 \times 10^{11} t + 300 \pi x) T$$

- (i) calculate the λ of electro magnetic wave
- (ii) Find the amplitude of electric field

Part - IV

$$5 \times 5 = 25M$$

IV Answer all questions :-

34) Show the Lenz's law in accordance with the law of conservation of energy

(or)

Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of 1 cycle.

35) Find out the phase relationship between voltage & current in a pure inductive circuit.

(or)

A straight metal wire crosses a magnetic field flux $4m\text{ Wb}$ in a time $0.4s$. Find the magnitude of emf induced in the wire.

36) Explain the working of a single phase AC generator with necessary diagram.

(or)

Show how to generalize Ampere's circuital law to include the term due to displacement current.

37) Discuss the Hertz experiment

(or)

Maxwell equation in Integral form

38) Explain the importance of Maxwell's correction

(or)

The full form of (i) AM Band (iii) TV range (v) UHF
(ii) SW Band (iv) FM range

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