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Reg. No.

12202

## Quarterly Examination - 2022 PHYSICS

Time : 3.00 hrs.

Max. Marks : 70

**Note : (I) Answer all the questions.****15 x 1 = 15****(II) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.**

1. Two points A and B are maintained at a potential of 7V and -4V respectively. The work done in moving 50 electrons from A to B is  
a)  $8.80 \times 10^{-17}$  J b)  $-8.80 \times 10^{-17}$  J c)  $4.40 \times 10^{-17}$  J d)  $5.80 \times 10^{-17}$  J
2. Which charge configuration produces a uniform electric field?  
a) point charge b) uniformly charged infinite line c) uniformly charged infinite plane d) uniformly charged spherical shell
3. The work done in moving 400  $\mu$ C charge between two points on equipotential surface is  
a) zero b) positive c) negative d) infinite
4. A toaster operating at 240 V has a resistance of 120  $\Omega$ . Its power is  
a) 400 W b) 2 W c) 480 W d) 240 W
5. Unit of mobility is  
a)  $\text{ms}^{-1}$  b)  $\Omega\text{m}$  c)  $\text{m}^2\text{v}^{-1}\text{s}^{-1}$  d)  $\text{m}^{-2}\text{vs}$
6. The internal resistance of a 2.1 V cell which gives a current of 0.2A through a resistance of 10 $\Omega$  is  
a) 0.2  $\Omega$  b) 0.5  $\Omega$  c) 0.8  $\Omega$  d) 1.0  $\Omega$
7. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?  
a) 30° b) 45° c) 60° d) 90°
8. A non-conducting charged ring carrying a charge of q, mass m and radius r is rotated about its axis with constant angular speed  $\omega$ . Find the ratio of its magnetic moment with angular momentum is  
a)  $\frac{q}{m}$  b)  $\frac{2q}{m}$  c)  $\frac{q}{2m}$  d)  $\frac{q}{4m}$
9. An ideal voltmeter has.....resistance.  
a) zero b) 1 c) infinite d) none of the above.
10. Which of the following devices does not allow d.c to pass through?  
a) Resistor b) Capacitor c) inductor d) all the above
11. In a transformer, the number of turns in the primary and the secondary are 410 and 1230 respectively. If the current in primary is 6A, then that in the secondary coil is  
a) 2A b) 18A c) 12A d) 1A
12. In a series RL circuit, the resistance and inductive reactance are the same. Then the phase different between the voltage and current in the circuit is  
a)  $\pi/4$  b)  $\pi/2$  c)  $\pi/6$  d) zero
13. The dimension of  $\frac{1}{\mu_0\epsilon_0}$  is  
a)  $[\text{LT}^{-1}]$  b)  $[\text{L}^2\text{T}^{-2}]$  c)  $[\text{L}^{-1}\text{T}]$  d)  $[\text{L}^{-2}\text{T}^2]$
14. The electromagnetic wave of energy E is incident on totally reflected surface, then the momentum delivered to the surface is  
a) E/C b) 2E/C c) EC d) E/C<sup>2</sup>
15. Which of the following is an electromagnetic wave?  
a)  $\alpha$  ray b)  $\beta$  ray c)  $\gamma$  ray d) all of them



**PART - II****II. Answer any six questions. (Q.No.18 is compulsory)****6 x 2 = 12**

16. Define Electric flux?
17. What is corona discharge?
18. In a meter bridge experiment, the value of resistance in the resistance box connected in the right gap is  $10\Omega$ . The balancing length is  $l_1 = 55\text{cm}$ . Find the value of unknown resistance?
19. State Joule's law of heating?
20. What is meant by hysteresis?
21. State Ampere's circuital law?
22. The self-inductance of an air-core solenoid is  $4.8\text{ mH}$ . If its core is replaced by iron core, then its self-inductance becomes  $1.8\text{ H}$ . Find out the relative permeability of iron?
23. Define Q-factor?
24. What is displacement current?

**PART - III****III. Answer any six questions (Q.No.31 is compulsory)****6 x 3 = 18**

25. Obtain the expression for capacitance for a parallel plate capacitor?
26. Dielectric strength of air is  $3 \times 10^6\text{ vm}^{-1}$ . Suppose the radius of a hollow sphere in the Van de Graff generator is  $R = 0.5\text{ m}$ , calculate the maximum potential difference created by this Van de Graff generator?
27. Derive the expression for resultant Resistance, when resistors are connected in series?
28. State Kirchhoff's current and voltage rule?
29. How will you induce an emf by changing the area enclosed by the coil?
30. List out salient features of magnetic Lorentz force?
31. The equation for an alternating current is given by  $i = 77 \sin 314t$ . Find the peak current, frequency, time period and instantaneous value of current at  $t = 2\text{ms}$ .
32. Explain the conversion of galvanometer into Ammeter?
33. Write down the properties of electromagnetic waves?

**PART - IV****IV. Answer all the questions.****5 x 5 = 25**

34. a) Calculate the electric field due to a dipole on its axial line? (OR)  
b) Derive an expression for phase angle between the applied voltage and current in a series RLC circuit?
35. a) Obtain the condition for bridge balance in wheatstone's bridge? (OR)  
b) Obtain the expression for electric field due to an infinitely long charged wire?
36. a) Deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current. (OR)  
b) Explain the construction and working of transformer?
37. a) Describe the microscopic model of current and obtain general form of Ohm's law? (OR)  
b) Derive the expression for the force on a current carrying conductor in a magnetic field?
38. a) What is spectrum? Explain the types of emission spectrum? (OR)  
b) Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle?