M2019

No. of Printed Pages : 4

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PART – III

, awgpay / PHYSICS

(English Version)

Time Allowed : 3.00 Hours] **[Maximum Marks : 70**

Instructions : (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

PART – I

Note : (i) Answer **all** the questions. **15x1=15**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. The magnitude of electric intensity at a distance 'r' from the centre of an electric dipole along its axial line is E. The distance of the point from the centre of the electric dipole along its equatorial line at which the electric intensity has same value E is :

(a) $\frac{r}{\sqrt{2}}$ (b) $\frac{r}{(3)^{\frac{1}{3}}}$ (c) $r(2)^{\frac{1}{3}}$ (d) $\frac{r}{(2)^{\frac{1}{3}}}$

2. A beam of protons and α-particle are successively accelerated in a cyclotron. The ratio of the normal magnetic field to be applied to the cyclotron so that protons and α-particles have the same period of rotation is :

(a) 1:4 (b) 4:1 (c) 1:2 (d) 2:1

3. Two sample of radioactive substances have the same quantity. $\frac{1}{16}$th portion of A and $\frac{1}{256}$th portion of B remain un-decayed after 8 hours. The ratio of half-life periods of A and B is :

(a) 1:4 (b) 4:1 (c) 1:2 (d) 2:1

4. The threshold frequency of a photo-sensitive surface is $5x10^{14}$ Hz. Then which of the following can produce photoelectric emission from the same surface?

(a) Ruby-Laser light (b) He-Ne Laser light

(c) Xenon flash light (d) Both (a) and (b)

5. Which of the following devices does not allow d.c. to pass through?

(a) resistor (b) capacitor (c) inductor (d) all the above

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6. The distance of closest approach of α-particle reaching a nucleus with momentum 'p' is r_0. When the α-particle travels towards the same nucleus with momentum $\frac{p}{2}$, the distance of closest approach will be :

(a) $4r_0$ (b) $\frac{r_0}{4}$ (c) $2r_0$ (d) $\frac{r_0}{2}$

7. If β is the bandwidth, in Young's double slit experiment, the distance between the first dark band and sixth bright band is:

(a) $5\frac{1}{2}$ β (b) 6 β (c) 11 β (d) 5 β

8. According to the laws of Boolean algebra, the expression (A+AB) is equal to:

(a) B (b) $\overline{A}$ (c) A (d) AB

9. Point charges 1 μC and 6 μC are placed in air at a certain distance apart. The magnitude of the force on 1 μC by 6 μC is F_1. The magnitude of the force on 6 μC by 1 μC F_2. Then $F_1 : F_2$ is :

(a) 1:1 (b) 36:1 (c) 1:6 (d) 6:1

10. High frequency waves follow:

(a) ionospheric propagation (b) the curvature of the earth
(c) the ground wave propagation (d) the line of sight direction

11. When a hydrogen atom absorbs an energy of 10.2 eV, the change in its angular momentum is:

(a) 4.14×10^{-15} Js (b) 0.525×10^{-34} Js
(c) 1.05×10^{-34} Js (d) 2.1×10^{-34} Js

12. Avalanche breakdown is primarily dependent on the phenomenon of :

(a) doping (b) recombination
(c) collision (d) ionization

13. The alternating current in a circuit is given by the equation $i = 10\sin\left(100\pi t + \frac{\pi}{6}\right)$. The current attains its first maximum at t is :

(a) $\frac{1}{600}$ s (b) $\frac{1}{50}$ s (c) $\frac{1}{100}$ s (d) $\frac{1}{300}$ s

14. An electric bulb is marked 220 V, 100W. When it is connected across 110 V, its power is:

(a) 200 W (b) 173.2 W (c) 50 W (d) 25 W

15. Phosphor-bronze wire is used for suspension in a moving coil galvanometer, because it has:

(a) large couple per unit twist (b) small couple per unit twist

(c) high conductivity (d) high resistivity

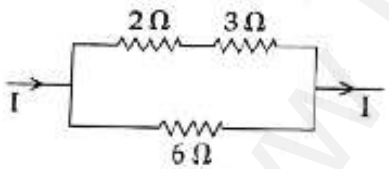
PART – II

Note : Answer any six questions. Question No. 24 is compulsory. 6x2=12

16. Define electric dipole moment. Give its unit.
17. State Ohm's Law.
18. Define Peltier Coefficient.
19 State De-Morgan's theorems.
20. Write the uses of infra-red rays.
21. What are the characteristics of laser?
22. The de-Broglie wavelength of a neutron of kinetic energy K is λ. When its kinetic energy is 4 K, what is the de-Broglie wavelength of the neutron?
23. Define curie.
24. The number of turns in the primary of an ideal transformer is 400 and that in the secondary is 2000. If the output power from the secondary at 1000 V is kW then calculate the voltage and current in the primary coil.

PART – III

Note : Answer any six questions. Question No. 33 is compulsory. 6x3=18

25. Write the properties of electric lines of forces.
26. 

The heat developed across 6 Ω resistor per second is 50 J. Calculate the heat developed per second across 2 Ω resistor in the given electric circuit.

27. Write the special features of Magnetic Lorentz force.
28. Obtain an expression for the energy associated with an inductor.
29. Explain frequency modulation.
30. State and obtain Bragg's Law
31. Explain length contraction.

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32. Half lives of two radioactive elements are 12 hrs and 16 hrs respectively. If at any instant, the ratio of the amounts of radioactive substance is 2 : 1 , then after 2 days, What will be the ratio of the un-decayed portions?

33. In Young's double slit experiment two coherent sources of intensity ratio of 64:1, produce interference fringes. Calculate the ratio of maximum and minimum intensities.

PART – IV

Note : Answer **all** the questions. **5x5=25**

34. (a) Derive an expression for electric field intensity due to an electric dipole at a point on its axial line.

(OR)

(b) Obtain an expression for the magnetic induction at a point due to an infinitely long straight conductor carrying current.

35. (a) State Faraday's II Law of electrolysis. How is it verified experimentally?

(OR)

(b) Explain Raman Scattering of Light.

36. (a) Discuss with theory the method of inducting emf in a coil by changing its orientation with respect to the direction of the magnetic field.

(OR)

(b) Explain the working of a half wave diode rectifier.

37. (a) Explain the spectral series of hydrogen atom. (Diagram not necessary)

(OR)

(b) Explain the function of AM radio transmitter with neat block diagram.

38. (a) Explain the construction and working of a Geiger-Muller Counter.

(OR)

(b) Explain the working of photo emissive cell. Write any two applications of photoelectric cells.

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