12505

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12 SECOND REVISION EXAMINATION – FEBRUARY 2023

PART – III
PHYSICS

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. LEDs are available in a wide range of colours. Which is indicate white Colour semiconductor?

(a) AlGaP (b) GaAsP (c) SiC (d) GaInN

2. X-rays cannot be used in microscope, since they

(a) have low penetrating power (b) have lesser wavelength

(c) cannot be focused (d) have greater wavelength

3. In a large building, there are 15 bulbs of 40W, 5 bulbs of 100W, 5 fans of 80W and 1 heater of 1kW are connected. The voltage of electric mains is 220V. The minimum capacity of the main fuse of the building will be

(a) 14 A (b) 8 A (c) 10 A (d) 12 A

4. The electric and the magnetic field, associated with an electromagnetic wave, propagating along X axis can be represented by

(a) $\vec{E} = E_0\vec{j}$ and $\vec{B} = B_0\vec{k}$ (b) $\vec{E} = E_0\vec{k}$ and $\vec{B} = B_0\vec{j}$

(c) $\vec{E} = E_0\vec{i}$ and $\vec{B} = B_0\vec{j}$ (d) $\vec{E} = E_0\vec{j}$ and $\vec{B} = B_0\vec{i}$

5. For light incident from air on a slab of refractive index 2, the maximum possible angle of refraction is,

(a) 30^0 (b) 45^0 (c) 60^0 (d) 90^0

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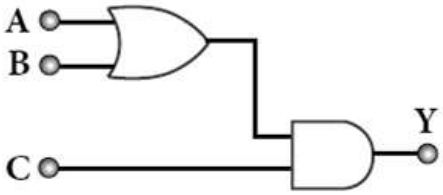
6. The output of the following circuit is 1 when the input ABC is



(a) 101 (b) 100 (c) 110 (d) 010

7. In J.J.Thomson e/m experiment, electrons are accelerated through 2.6 kV enter the region of crosses electric filled and magnetic field of strength 3.0×10^4 Vm and 1.0×10^{-3} T, respectively, and pass through it and un-deflected, then the specific charge is

(a) 1.6×10^{10} Ckg^{-1} (b) 1.7×10^{11} Ckg^{-1} (c) 1.5×10^{11} Ckg^{-1} (d) 1.8×10^{11} Ckg^{-1}

8. A plane glass is placed over a various coloured letters (violet, green, yellow, red) The letter which appears to be raised more is,

(a) red (b) yellow (c) green (d) violet

9. The charge on an oil drop is 12.8×10^{-19} C. Then the number of elementary charges are

(a) 8 (b) 10 (c) 12 (d) 9

10. A step-down transformer reduces the supply voltage from 220 V to 11 V and increase the current from 6 A to 100 A. Then its efficiency is

(a) 1.2 (b) 0.83 (c) 0.12 (d) 0.9

11. Two radiations with photon energies 0.9 eV and 3.3 eV respectively are falling on a metallic surface successively. If the work function of the metal is 0.6 eV, then the ratio of maximum speeds of emitted electrons in the two cases will be

(a) 1:4 (b) 1:3 (c) 1:1 (d)1:9

12. The method of making nanomaterial by assembling the atoms is called

(a) Top down approach (b) Bottom up approach

(c) Cross down approach (d) Diagonal approach

13. A non-conducting charged ring carrying a charge of q, mass m and radius r is rotated about its axis with constant angular speed ω. Find the ratio of its magnetic moment with angular momentum is

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

14. The magnetic moment of a magnet is 5 Am^2. If the pole strength is 25 A, then the length of the magnet is

(a) 25 cm (b) 20 cm (c) 10 cm (d) 5 cm

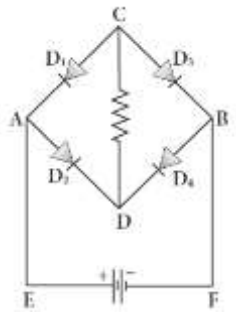
15. Two metallic spheres of radii 1 cm and 3 cm are given charges of -1×10^{-2} C and 5×10^{-2} C respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is

(a) 3×10^{-2}C (b) 4×10^{-2}C (c) 1×10^{-2}C (d) 2×10^{-2}C

PART – II

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

16. If the focal length is 150 cm for a glass lens, what is the power of the lens?
17. What is called electric dipole? Give an example.
18. Distinguish electric energy and electric power.
19. Define Curie's law.
20. Define mean value or average value of AC.
21. What is called modulation?
22. State the properties of neutrino.
23. A proton and an electron have same kinetic energy. Which one has greater de Broglie wavelength. Justify.
24. Four silicon diodes and a 10 Ω resistor are connected as shown in figure below. Each diode has a resistance of 1Ω. Find the current flows through the 18Ω resistor.



PART – III

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

25. The rod given in the figure is made up of two different materials

Both have square cross sections of 3 mm side. The resistivity of the first material is 4×10^{-3} Ωm and that of second material has resistivity of 5×10^{-3} Ωm. What is the resistance of rod between its ends?

26. Derive an expression for capacitance of parallel plate capacitor.

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27. Explain the applications of hysteresis loop.

28. Obtain an expression for motional emf from Lorentz force.

29. Write the uses of X –rays and gamma rays.

30. Derive the equation for lateral displacement of light passing through a glass slab.

31. Distinguish between interference and diffraction.

32. What are the constituent particles of neutron and proton?

33. Calculate the energies of the photons associated with the following radiation:

(i) Violet light of 413 nm (ii) X-rays of 0.1 nm

PART – IV

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

34. (i) Write down any six properties of electromagnetic wave.

(ii) Compute the speed of electromagnetic wave in medium if the amplitudes of electric and magnetic fields in it are 3×10^{4} NC^{-1} and 2×10^{-4} T respectively.

(OR)

Explain in detail how charges are distributed in a conductor and the principle behind the lightning conductor.

35. Obtain the condition for bridge balance in Wheatstone's bridge.

(OR)

Prove laws of reflection using Huygens' Principle.

36. Obtain a relation for the magnetic induction at a point along the axis of a circular coil carrying current.

(OR)

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

37. Derive the expression for radius and energy of the n^{th} orbit of hydrogen atom using Bohr atom model.

(OR)

Obtain Einstein's photoelectric equation with necessary explanation.

38. Transistor functions as a switch. Explain.

(OR)

Describe the Fizeau's method to determine speed of light.

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