HSL
XII - Std

HALF YEARLY EXAMINATION - 2022
PHYSICS

Time : 3.00 Hrs

Marks : 70

Part - A

Answer all the questions :-   15 X 1 = 15

1. Two identical conducting balls having positive charges q_1 and q_2 are separated by a centre to centre distance r. If they are made to touch other and then separated do the same distance, the force between them will be
   a) Less than before   b) same as before   c) more than before   d) Zero

2. Pick out the statement which is incorrect
   a) The electric field lines forms closed loop   b) Field lines never intersect
   c) The tangent drawn to a line of force represents the direction of electric field
   d) A negative test charge experiences a force opposite to the direction of the field

3. There is a current of 1.0 A in the circuit shown below.
   What is the resistance of P?   a) 1.5 Ω   b) 2.5 Ω
   c) 3.5 Ω   d) 4.5 Ω
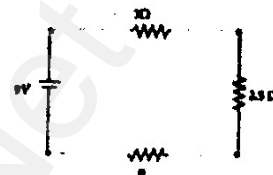
4. By a cell a current of 0.9 A flows through 2 Ω resistor and 0.3 A through 7 Ω resistor. The internal resistance of the cell is
   a) 0.5 Ω   b) 1.0 Ω   c) 1.2 Ω   d) 2.0 Ω

5. The potential energy of magnetic dipole whose dipole moment is $\vec{P}_m = \left(-0.5\vec{i} + 0.4\vec{j}\right) Am^2$ kept in uniform magnetic field $\vec{B} = 0.2\vec{i}T$
   a) -0.1J   b) -0.8J   c) 0.1J   d) 0.8J

6. The instantaneous values of alternating current and voltage in circuit are $i = \frac{1}{\sqrt{2}}\sin(100\pi t)\, A$ and
   $v = \frac{1}{\sqrt{2}}\sin\left(100\pi t + \frac{\pi}{3}\right)V$. The average power in watt consumed in the circuit is
   a) $\frac{1}{4}$ b) $\frac{\sqrt{3}}{4}$ c) $\frac{1}{2}$ d) $\frac{1}{8}$

7. Which of the following is false for electromagnetic waves
   a) Transverse   b) non -mechanical waves   c) Longitudinal   d) produced by accelerating charges

8. When a biconvex lens of glass having refractive index 1.47 is dipped in a liquid, it acts as a plane sheet of glass. This implies that the liquid must have refractive index,
   a) less than one   b) less than that of glass   c) greater than that of glass   d) equal to that of glass

9. If the central portion of a convex lens is wrapped in black paper, as shown in the figure.
   a) No image will be formed by the remaining portions of the lens
   b) The full image will be formed but it will be less bright
   c) The central portion of the image will be missing
   d) There will be two images each produced by one of the exposed portions of the lens.

10. The dual nature of light is exhibited by   a) Photo electric effect   b) Refraction and interference
    c) diffraction and reflection   d) diffraction and photoelectric effect

11. A plane glass is placed over a various coloured letters (violet, green, yellow and red). The letter which appear to be raised less is
    a) red   b) yellow   c) green   d) violet

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12. Emission of electrons by the absorption of heat energy is called ———— emission
    a) Photoelectric   b) field   c) thermionic   d) secondary

13. The charge of cathode ray particle is
    a) positive   b) negative   c) neutral   d) not defined

14. The light emitted in an LED is due to
    a) recombination of charge carriers   b) reflection of light due to lens action
    c) Amplification of light falling at the junction   d) Large current capacity

15. The technology used for stopping the brain from processing pain is
    a) Precision medicine   b) Wireless brain sensor   c) Virtual reality   d) Radiology

PART - B

Answer any six but, Q.No. 24 is compulsory :- $6 \times 2 = 12$

16. What is action at point? Or corona discharge
17. State Maxwell's right hand cork screw rule.
18. Give the principle of AC generator
19. Explain the reason for glittering the diamond.
20. The wavelength of a light is 450nm. How much phase it will differ for a path of 3 mm ?
21. What is photoelectric effect?
22. Explain, why the spectrum of hydrogen atoms has many lines, although a hydrogen atom contains only one electron
23. Mention any two advantage and disadvantage of robotics.
24. Resistance of a material at 20°C and 40°C are 45 and 85 respectively. Find its temperature coefficient of resistivity.

Part - C

Answer any six but, Q.NO 33 is compulsory :- $6 \times 3 = 18$

25. Write the application of capacitor. Mention its disadvantage.
26. Write a short notes on super conductors. Mention the critical temperature of mercury.
27. How is galvanometer converted into ammeter and voltmeter?
28. An ideal transformer has 460 and 40,000 turns in the primary and secondary coils respectively. Find the voltage developed per turn of the secondary if the transformer is connected to a 230 V, AC mains. The secondary is given to a load of resistance. Calculate the power delivered to the load.
29. Write down the integral form of modified Ampere's circuital law or Ampere- Maxwell law. Mention the signification of this law.
30. Discuss the optical device Nicol Prism.
31. The De-Broglie wavelength of a photon is as same as the wavelength of an electron. Show that the KE of photon is $\frac{2\lambda mc}{h}$ times the KE of the electron, where m is the mass of electron and c is the velocity of light.
32. Give the Barkhausen condition for sustained oscillations.
33. Find the ratio of the intensities of lights with wavelength 500 nm and 300nm which undergo Rayleigh scattering.

Part- D

Answer the following question, draw the diagram wherever necessary :- $5 \times 5 = 25$

34. Calculate the electric field due to a dipole on its axial line. *(OR)*
    Explain the determination of the internal resistance of the cell using voltmeter
35. Deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current using Biot-Savart law. *(OR)*
    Obtain an expression for motional emf from Lorentz force
36. Write down the properties of electromagnetic waves. *(OR)*
    Obtain lens marker's formula and mention its signification.
37. Explain the young's double slit experimental setup and obtain the equation for path difference. *(OR)*
    Obtain Einstein's photoelectric equation with necessary explanation.
38. Describe the working of nuclear reactor with block diagram. *(OR)*
    State and prove De Morgan's first and second theorem.

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