Model Question Paper

Class-XII (SOS)

Subject-Physics (Session : 2020-21)

Time Allowed : 3 hrs   **Maximum Marks : 75**

Special Instructions:

(i) All questions are compulsory

(ii) Candidates are required to give answers in their own words as far as practicable.

(iii) 30% extra internal choice is being given in the questions.

(iv) Question number 1 to 8 are MCQ type carrying one mark each. Question number 9 to 14 are very short answer type questions carrying 2 marks each.

Question number 15 to 19 are short answer type questions carrying three marks each and question number 25 to 28 are very long answer type carrying five marks each.

1. What are the units of absolute permittivity $\in_0$?
   (a) $C^2 N^{-1} m^{-2}$ (b) $N m^2 C^{-2}$
   (c) $N m^2 C^2$ (d) None of these   1

2. Two resistance of 2Ω and 4Ω are connected in parallel. What will be the equivalent resistance of this combination?

   (a) $\dfrac{3}{4}\Omega$ (b) 4Ω

   (c) $\dfrac{4}{3}\Omega$ (d) 6Ω

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3. Force experienced by a proton at rest in the magnetic field is

    (a) Zero   (b) $\vec{v} \times \vec{B}$

    (c) $qvB\sin\theta$ (d) None of these   1

4. The peak value of alternating voltage is related to its rms value as

    (a) $v_m = \sqrt{2}\, v_\circ$ (b) $v_{rms} = \dfrac{v_\circ}{\sqrt{2}}$

    (c) $v_{rms} = v_\circ$ (d) $v_\circ = \dfrac{v_{rms}}{2}$ 1

5. The first person to broadcast and receive radio waves was

    (a) Maxwell   (b) Hertz

    (c) Marcony   (d) S.N. Bose   1

6. Brilliance of diamond is due to

    (a) Scattering   (b) Interference

    (c) Total internal reflection (d) Diffraction   1

7. The momentum of photon is

    (a) $\dfrac{h}{\lambda}$ (b) $h\nu$

    (c) Zero   (d) E/λ 1

8. When a forward bias is applied to a p–n junction. It

    (a) Raises the potential barrier

    (b) Reduces the majority carrier current to zero

    (c) Lowers the potential barrier

    (d) None of the above   1

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9. Define electric dipole moment. Give its SI units and direction.　　2

10. Give the principle of meter bridge. Calculate the unknown resistance using meter bridge.

Or

Give the principle of potentiometer. Draw a diagram for comparing the emf of two cells using a potentiometer.　　2

11. Explain the domain theory for ferromagnetism.

Or

What are diamagnetic substances? Give their two properties.

12. Capacitor blocks dc, whereas it offers less resistance to a.c. why?

Or

What is inductive reactance? Give its SI units.　　2

13. Discuss Bohr's quantisation condition.

Or

Give Einstein's photoelectric equation. What is threshold frequency?　　2

14. Give a short note on ground wave propagation of e.m. waves.

Or

What is sky wave propagation? Explain in brief.　　2

15. What are the necessary conditions for sustained interference to take place?　　3

16. Using new cartesian sign conventions, derive

$$-\frac{n_2}{u} + \frac{n_1}{v} = \frac{n_1 - n_2}{R}$$

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when refraction occurs at convex spherical surface and object lies in denser medium. 3

17. Give two uses of
    (a) X-rays   (b) Infra red rays

    Or

    What is electromagnetic spectrum? Arrange its main components in order of increasing frequency. 3

18. Derive an expression for de-Broglie wavelength of electron accelerated through a potential difference V. 3

19. Distinguish between p-type and n-type semiconductors.

    Or

    Differentiate between intrinsic and extrinsic semiconductors.

20. What is axial line of an electric dipole? Derive an expression for the electric field at a point lying on the axial line of an electric dipole.

    Or

    State and prove Gauss theorem. 4

21. What is Wheatstone bridge? Derive an expression for balanced Wheatstone bridge. 4

22. State Biot-Savart's law. Using this law derive an expression for magnetic field at a point due to infinitely long straight current carrying conductor. 4

23. What is transformer? Explain its types. Give the principle, construction and working of a transformer.

    Or

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Or

Define impedance of LCR series ac circuit. Derive an expression for it.

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24. (a) Explain Faraday's laws of electromagnetic induction.

    (b) Give reason for the blue colour of sky. 2+2=4

25. (a) State two properties of electric field lines. 2

    (b) Explain the process of alpha decay. 3

Or

    (a) Calculate electric potential due to a single point charge.

    (b) Explain the process of beta decay. 3

    2+3=5

26. (a) Define Kirchhoff's laws. 2

    (b) Give symbol, Boolean expression and truth table for NAND gate. 3

    2+3=5

27. Derive lens makers' formula for convex lens and state new cartesian sign conventions.

Or

What is diffraction of light? Find conditions for maxima and minima, when diffraction of light takes place at single slit. 5

28. (a) Derive an expression for torque experienced by a magnetic dipole in uniform magnetic field. 2

    (b) What is modulation? What is its necessity. 3

    (2+3=5)

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