SHRI KRISHNA ACADEMY

NEET, JEE AND BOARD EXAM(10, +1, +2) COACHING CENTRE,EDUCATIONAL CONSULTANCY
SBM SCHOOL CAMPUS, TRICHY MAIN ROAD, NAMAKKAL
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CLASS: XII   **TIME   : 3.00 Hours**
SUBJECT: PHYSICS   **MARK: 70**

I.Choose and write the correct answer   15x1=15

1. A toaster operating at 240 V has a resistance of 180 Ω. The power is

    a) 400 W   b)320 W   c) 480 W   d) 240 W

2. The instantaneous values of alternating current and voltage in a circuit are
    $i = \frac{1}{\sqrt{2}} \sin(100 \pi t) A$ and $v = \frac{1}{\sqrt{2}} \sin(100 \pi t + \frac{\pi}{3}) v$. The average power in watts consumed in the circuit is

    (a) 1 / 4   (b)$\frac{\sqrt{3}}{4}$ (c) 1 / 2   (d) 1 / 8

3. The image formed in a convex mirror…………

    a)virtual   b)erect   c)diminished in size   d)All the above

4. The signal is affected by noise in a communication system

    (a) At the transmitter   (b) At the modulator   (c) In the channel   (d) At the receiver

5. 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

6. If R is Rydberg constant, the shortest wavelength of Paschen series is

    a) $\frac{R}{9}$ b) $\frac{9}{R}$ c) $\frac{16}{R}$ d) $\frac{25}{R}$

7. An element A decays into the element C by A $\longrightarrow$ B+α particle and B $\longrightarrow$ C+2β particles, then

    a) A and C are isotopes   b) B and C are isobars   c) A and C are isotones   d) both (a) and (b) holds good

8. If the ratio of mass numbers of two atomic nuclei is 8:27 then their nuclear densities are in the ratio of

    a) 8:27   b) 2:3   c) 3:2   d) 1:1

9. A Gaussian surface of cylinder of length l, radius r, closed at each end by plane caps normal to the axis enclosed an uniformly charged wire of infinite length having a constant linear charge density λ the electric flux through each plane cap is

    a) E.2πrl   b) $\lambda / 2\pi \in_0 r$ c) $\sigma / 2 \in_0$ d) Zero

10. A source of light with a velocity C/2 towards a stationary observer, then the speed of light is

    a) 3C/2   b) C/2   c) 2C   d) C

11. If the frequency of the RLC series circuit is increased beyond the resonant frequency then the current in this circuit

    a) increases   b) attains maximum value   c) decreases   d) remains same

12.   If the magnet is cut into four equal parts such that their lengths and breadths are equal. Pole strength of each part is

       a) m   b) m/2   c) m/4   d) m/8

13.   The ratio of the specific charge of an electron to that of a positron is

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

14.   In millikan's oil drop experiment, charged oil drop is balanced between the two plates. Now the viscous force

       a) acts downwards   b) acts upwards

       c) is zero   d) acts either upwards or downwards

15.   The capacitance of a parallel plate capacitor increases from 5 μF to 50 μF when a dielectric is filled between the plates. The permittivity of the electric is

       a) 8.854 x 10^{-12} C^2 N^{-1} m^{-2} b) 8.854 x 10^{-11} C^2 N^{-1} m^{-2}

       c) 12   d) 10

II. Answer any SIX of the following questions : (Q.No. 24 is compulsory)   6 x 2 = 12
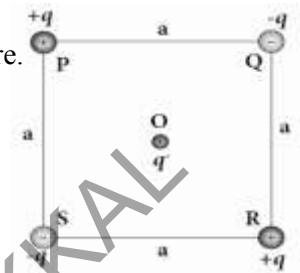
16.   Can two equipotential surfaces intersect? Give reason.

17.   The resistance of a wire is 20 Ω. What will be new resistance, if it is stretched uniformly 8 times its original length?

18.   How will you define threshold frequency?

19.   Give any one definition of power factor. Give its unit.

20.   What is the reason for reddish appearance of sky during sunset and sunrise?

21.   Differentiate between Fresnel and Fraunhofer diffraction.

22.   (A) What is mean life of nucleus? Give the expression.

       (B) What is half-life of nucleus? Give the expression.

23.   Using the relation $\vec{B} = \mu_0 (\vec{H} + \vec{M})$, show that $\chi_m = \mu_r - 1$

24.   Prove the following Boolean expressions using the laws and theorems of Boolean algebra.

       i) $(A+B)(A+\bar{B}) = A$

       ii) $(A+B)(A+C) = A+BC$

III.   Answer any SIX of the following questions : (Q.No.33is compulsory)   6 x 3 = 18

25.   How the emf of two cells are compared using potentiometer?

26.   Compute the torque experienced by a magnetic needle in a uniform magnetic field.

27.   A circular loop of area 5 X $10^{-2}m^2$ rotates in a uniform magnetic field of 0.2 T. If the loop rotates about its diameter which is perpendicular to the magnetic field as shown in figure. Find the magnetic flux linked with the loop when its plane is (i) normal to the field (ii) inclined 60° to the field and (iii) parallel to the field.

28.   Write down the properties of electromagnetic waves.

29.   State and obtain Malus' law.

30.   Light of wavelength 390 *nm* is directed at a metal electrode. To find the energy of electrons ejected, an opposing potential difference is established between it and another electrode. The current of photoelectrons from one to the other is stopped completely when the potential difference is 1.10 *V*. Determine i) the work function of the metal and ii) the maximum wavelength of light that can eject electrons from this metal.

31.   Discuss the spectral series of hydrogen atom.

32.   Define FM. What are its advantages and its limitations.

33.   Four charges are arranged at the corners of the square *PQRS* of side *a* as shown in the figure.

       (a) Find the work required to assemble these charges in the given configuration.

       (b) Suppose a charge q′ is brought to the center of the square, by keeping the four charges fixed at the corners, how much extra work is required for this?

IV. Answer any FIVE of the following questions :   5 x 5 = 25

34.   Discuss the working of cyclotron in detail.

(OR)

Write down Maxwell equations in integral form.

35.   Derive an expression for electrostatic potential due to an electric dipole.

(OR)

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

36.   Derive the equation for acceptance angle and numerical aperture, of optical fiber.

(OR)

(i)Explain the construction and working of a full wave rectifier.

(ii)What is an LED? Give the principle of operation with a diagram.

37.   Discuss diffraction at single slit and obtain the condition for nth minimum.

       (OR)

Explain the J.J. Thomson experiment to determine the specific charge of electron.

38.   (i)Explain the determination of the internal resistance of a cell using voltmeter.

       (ii)What is Thomson effect?

(OR)

Explain the effect of potential difference on photoelectric current.

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