



Standard 12

PHYSICS

Part - I

Time: 3.00 Hours

Marks: 70

Answer all the questions

15×1=15

Choose the appropriate answer from the given four alternatives and write the option code and the corresponding answer.

- 1) Half-lives of two radioactive elements A and B are 20 minutes and 40 minutes respectively. Initially the samples have equal number of nuclei. After 80 minutes the ratio of decayed numbers of A and B nuclei will be:
 - a) 4 : 1
 - b) 1 : 4
 - c) 5 : 4
 - d) 1 : 16
- 2) The unit of Planck's constant h is that of
 - a) work
 - b) force
 - c) linear momentum
 - d) angular momentum
- 3) The RMS voltage and frequency of the alternating source $V = 230 \sin 314 t$ is
 - a) 162.6 V, 50 Hz
 - b) 230 V, 314 Hz
 - c) 230 V, 50 Hz
 - d) 162.6 V, 25 Hz
- 4) The colour code for a 56 k Ω carbon resistor with tolerance value 5% is
 - a) Green Blue Orange Gold
 - b) Yellow Green Red Gold
 - c) Yellow Green Orange Silver
 - d) Green Yellow Red Silver
- 5) In Joule's law of heating, when R and t are constant, if the H is taken along the y -axis and I^2 along the x -axis, the graph is
 - a) straight line
 - b) Parabola
 - c) Circle
 - d) ellipse
- 6) The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?
 - a) 30°
 - b) 45°
 - c) 60°
 - d) 90°
- 7) Fraunhofer lines are an example of spectrum.
 - a) Line emission
 - b) Line absorption
 - c) Band emission
 - d) Band absorption
- 8) A dipole ($5\mu\text{C} - 5\mu\text{C}$) is separated by 8 mm. The electric potential at a point 20 mm along its equatorial line will be volt.
 - a) 9×10^4
 - b) 18×10^4
 - c) 18×10^5
 - d) zero
- 9) The blue print for making ultra durable synthetic material is mimicked from
 - a) Lotus leaf
 - b) Morpho butterfly
 - c) Parrot fish
 - d) Peacock feather
- 10) The particle which gives mass to protons and neutrons are
 - a) Higgs particle
 - b) Einstein Particle
 - c) Nano particle
 - d) Bulk particle
- 11) A man of height 6 feet wants to buy a plane mirror to see his full image. The minimum height of the mirror that he should buy is
 - a) 3 feet
 - b) 6 feet
 - c) 9 feet
 - d) 1.5 feet
- 12) The nucleus is approximately spherical in shape. Then the surface area of nucleus having mass number A varies as
 - a) $A^{2/3}$
 - b) $A^{4/3}$
 - c) $A^{1/3}$
 - d) $A^{5/3}$
- 13) In an electron microscope, the electrons are accelerated by a voltage of 14 KV. If the voltage is changed to 224 KV, then the de Broglie wave length associated with the electrons would
 - a) Increase by 2 times
 - b) decrease by 2 times
 - c) decrease by 4 times
 - d) Increase by 4 times
- 14) Two coherent monochromatic light beams of intensities I and $4 I$ are superposed. The maximum and minimum possible intensities in the resulting beam are
 - a) $5 I$ and I
 - b) $5 I$ and $3 I$
 - c) $9 I$ and I
 - d) $9 I$ and $3 I$
- 15) Consider the junction diode is ideal. The value of current flowing through AB is



- a) 0 A
- b) 10^{-2} A
- c) 10^{-1} A
- d) 10^{-3} A

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Part - II**Answer any 6 questions. Question No. 22 is compulsory.****6×2=12**

- 16) Write a short note on electrostatic shielding.
- 17) Distinguish between drift velocity and mobility.
- 18) A coil of 200 turns carries a current of 0.4 A. If the magnetic flux of 4 mWb is linked with the coil, find the inductance of the coil.
- 19) Why do clouds appear white?
- 20) List the uses of polaroids.
- 21) Define work function of a metal. Give its units.
- 22) The radius of 5th orbit of hydrogen atom is 13.25 \AA . Calculate the de Broglie wavelength of the electron orbiting in the 5th orbit?
- 23) What is meant by stop zone?
- 24) Mention any two advantages and disadvantages of Robotics.

Part - III**Answer any 6 questions. Question No. 29 is compulsory.****6×3=18**

- 25) Obtain the expression for energy stored in the parallel plate capacitor.
- 26) Compute the torque experienced by a magnetic needle in a uniform magnetic field.
- 27) Mention the various losses in a transformer.
- 28) Write down the properties of electromagnetic waves.
- 29) A biconvex lens has radii of curvature 20 cm and 15 cm for the two curved surfaces. The refractor index of the material of the lens is 1.5.
 - a) What is its focal length?
 - b) Will the focal length change if the lens is flipped by the side?
- 30) Discuss about Nicol prism.
- 31) Give the construction and working of photo-emissive cell.
- 32) Explain the variation of average binding energy with the mass number using graph and discuss about its features.
- 33) Prove the following Boolean expressions using the laws and theorems of Boolean algebra:
 - i) $(A + B)(\overline{A + B}) = A$
 - ii) $A(\overline{A + B}) = \overline{AB}$
 - iii) $(A + B)(A + C) = A + BC$

Part - IV**Answer all the questions.****5×5=25**

- 34) a) Explain in detail the construction and working of a Van-de-Graaff generator.
(OR)
- b) Derive the expression for phase angle between the applied voltage and current in a series RLC circuit.
- 35) a) Obtain the equation for bandwidth in Young's double slit experiment.
(OR)
- b) Describe the function of a transistor as an amplifier with the neat circuit diagram. Sketch the input and output wave forms.
- 36) a) Explain the determination of the internal resistance of a cell using potentiometer.
(OR)
- b) Describe the working of nuclear reactor with block diagram.
- 37) a) Find the magnetic induction due to a long straight conductor using Ampere's circuital law.
(OR)
- b) What is absorption spectra? Give their types.
- 38) a) Explain and derive the equation for apparent depth.
(OR)
- b) Describe briefly Davisson - Germer experiment which demonstrated the wave nature of electrons.
