

Standard 12

PHYSICS

Part - I

Time Allowed: 3.00 Hours

Maximum Marks: 70

I. Answer all the questions. Choose the correct answer: **15×1=15**

1) In Millikan's oil drop experiment, an oil drop of mass 16×10^{-10} g is balanced by an electric field of 10^5 Vm^{-1} . the charge in coulomb on the drop is ____ (assume $g = 10 \text{ ms}^{-2}$)

- a) 16×10^{-17} b) 16×10^{-14} C c) 16×10^{17} C d) 16×10^{14} C

2) A piece of copper and germanium are cooled from room temperature to 80 K. The resistance of

- a) each of them increases b) each of them decreases
c) copper increases and germanium decreases
d) copper decreases and germanium increases

3) Which of the following does not travel in vacuum?

- a) Radio waves b) Sound waves c) Gamma rays d) Light waves

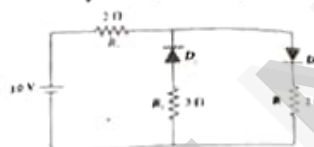
4) Two metallic spheres of radii 1 cm and 3 cm are given charges of -1×10^{-2} C and 5×10^{-2} C respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is

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

5) The given circuit has two ideal diodes connected as shown.

The current flowing through the resistance R_1 will be

- a) 2A b) 8.3 A



- c) 2.5 A d) 12 A

6) The mass defect of ${}^7_3\text{Li}$ nuclei is 0.042 U. Its binding energy per nucleon is ____

- a) 5.6 MeV b) 0.294 MeV c) 0.882 MeV d) 39.1 MeV

7) In a transformer, the number of turns in primary and secondary are 410 and 1230 respectively. If the current in the primary is 6A, then that in the secondary coil is ____

- a) 2A b) 18 A c) 12 A d) 1 A

8) The particle that cannot be accelerated by cyclotron

- a) electron b) proton c) positron d) neutron

9) Which of the electromagnetic wave is used for viewing objects through fog

- a) microwave b) gamma rays c) X-ray d) infra red

10) An object is placed in front of a concave mirror of focal length of f and the maximum and minimum distance of the object from the mirror such that the image formed is real

- a) $2F$ and p b) ∞ and P c) ∞ and f d) none of these

11) Atomic number of H-like atom with ionisation potential 122.4 V for $n = 1$ is

- a) 1 b) 2 c) 3 d) 4

12) 'Ski wax' is an application of nano product in the filed of ____

- a) medicine b) Textile c) Sports d) Automotive Industry

13) In a metre bridge, with a standard resistance of 5Ω in the right gap, the ratio of balancing lengths is 3:2. What is the value of unknown resistance

- a) 3.3Ω b) 7.5Ω c) 0.3Ω d) 10Ω

14) First diffraction minimum due to single slit of width 1.0×10^{-5} cm is at 30° . Then the wave length of light used is ____

- a) 400 \AA b) 500 \AA c) 600 \AA d) 700 \AA

15) The pole strength of a bar magnet is 30 NT^{-1} . if the magnet is cut into two equal halves perpendicular to the length, then the new pole strength will be

- a) 30 NT^{-1} b) 15 NT^{-1} c) 60 NT^{-1} d) 45 NT^{-1}

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Answer any six questions. Question no 22 is compulsory:

6×2=12

- 16) What is an equipotential surface?
- 17) The resistance of a nichrome wire at 0°C is 10Ω. If its temperature coefficient of resistance is 0.004/°C, find its resistance at boiling point of water.
- 18) An inductor block AC but it allows DC why? and How?
- 19) What is meant by Fraunhofer lines?
- 20) What is simultaneous reflection or refraction?
- 21) State Huygen's principle.
- 22) Calculate the cut-off wavelength and cut off frequency of X-rays from an X-ray tube of accelerating potential 20,000 V
- 23) Write the properties of cathode rays.
- 24) List out the applications of light emitting diode.

Part - III

Answer any six questions. Question no 27 is compulsory:

6×3=18

- 25) What is Seebeck effect? State the applications of Seebeck effect.
- 26) Compute the torque experienced by a magnetic needle in a uniform magnetic field.
- 27) A capacitor of capacitance $\frac{10^7}{\pi}$ μF is connected across at 220V, 50Hz AC mains. Calculate the capacitive reactance, RMS value of current and write down the equations of voltage and current.
- 28) Derive the relation between f and R for a spherical mirror.
- 29) Differentiate ordinary and extra ordinary rays.
- 30) Derive an expression for de-Broglie wavelength of electrons.
- 31) Discuss the spectral lines of hydrogen.
- 32) Four silicon diodes and a 10Ω resistor are connected as shown in figure below. Each diode has a resistance of 1Ω. Find the current flows through the 10Ω resistor.



- 33) What are the possible harmful effects of usage of Nanoparticles? Why?

Part - IV

Answer all the questions:

5×5=25

- 34) a) Discuss the diffraction at single slit and obtain the condition for n^{th} minimum.
(OR)
b) Discuss the working of cyclotron in details.
- 35) a) Briefly explain the principle and working of electron microscope.
(OR)
b) Explain the induction of emf by changing relative orientation of the coil with the magnetic field.
- 36) a) Explain the determination of unknown resistance using meter bridge.
(OR)
b) State and prove De-Morgan's first and second theorem.
- 37) a) What is emission spectra? Give their types.
(OR)
b) Obtain the law of radioactivity.
- 38) a) Obtain the expression for electric field due to an infinitely long charged wire.
(OR)
b) Describe the Frizeau's method to determine the speed of light.