

NORTH-EX PUBLIC SCHOOL
(Senior Secondary, Affiliated To CBSE)
School Block, Jain Nagar, Sector-38, Rohini, Delhi – 81
PERIODIC - 02, 2019-20
SUBJECT – PHYSICS
CLASS - XII

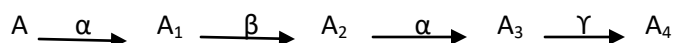
TIME: 1 hr 20 min

MM: 40

General Instructions:

- (i) All questions are compulsory
- (ii) There are 17 questions in total. Questions 1 to 5 are objective type questions carry one mark each.
- (iii) Questions 6 to 10 carry two marks each, questions 11 to 15 carry three marks each
- (iv) Questions 16 and 17 carry five marks each.
- (v) There is no overall choice.
- (vi) Use of calculators is not permitted. However, you may use log tables if necessary.

1. What is the cause of refraction of light?
2. What is plane polarized light?
3. Write Einstein's photoelectric equation.
4. What is the angular momentum of an electron in the 3rd orbit of an atom?
5. State two characteristic properties of nuclear forces.
6. What is mass defect of a nucleus? Express it mathematically.
7. Write limitations of Rutherford's model of the atom.
8. State the laws of photo-electric emission.
9. State Huygens' postulates of wave theory.
10. Only the stars near the horizon twinkle while those overhead do not twinkle. Why?
11. In a compound microscope, an object is placed at a distance of 1.5 cm from the objective of focal length 1.25 cm. If the eye piece has a focal length of 5 cm and the final image is formed at the near point, estimate the magnifying power of the microscope.
12. What is the effect on the interference pattern observed in a Young's double slit experiment in the following cases:
 - (i) Screen is moved away from the plane of the slits.
 - (ii) Separation between the slits is increased.
 - (iii) Widths of the slits are doubled.
13. An electron and a photon each have a wavelength of 1.0 nm. Find
 - (i) Their momenta,
 - (ii) The energy of the photon, and
 - (iii) The kinetic energy of the electron. Take $h = 6.63 \times 10^{-34}$ Js.
14. The total energy of an electron in the first excited state of the hydrogen atom is about -3.4 eV.
 - (i) What is the kinetic energy of the electron in this state?
 - (ii) What is the potential energy of the electron in this state?
 - (iii) Which of the answers above would change if the choice of the zero of potential energy is changed?
15. A radioactive nucleus 'A' undergoes a series of decays according to the following scheme:



The mass number and the atomic number of A are 180 and 72 respectively. What are these numbers for A₄?

16. Answer the following

- (i) Draw a ray diagram to show refraction of a ray of monochromatic light passing through a glass prism.
Deduce the expression for the refractive index of glass in terms of the angle of prism and angle of minimum deviation.
- (ii) Explain briefly how the phenomenon of total internal reflection is used in fibre optics.

17. Answer the following

- (i) Draw a graph showing variation of photoelectric current (I) with anode potential (V) for different intensities of incident radiation. Name the characteristic of the incident radiation that is kept constant in this experiment.
- (ii) If the potential difference used to accelerate electrons is doubled, by what factor does the de- Broglie wavelength associated with the electrons change?
- (iii) Using Rydberg formula, calculate the longest wavelengths belonging to Lyman and Balmer series. In which region of hydrogen spectrum do these transitions lie?
Take $R = 1.1 \times 10^7 \text{ m}^{-1}$