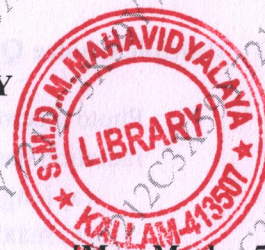


Total No. of Printed Pages: 2

B-2094

SUBJECT CODE NO: B-2094
FACULTY OF SCIENCE AND TECHNOLOGY
B.Sc. Pattern - 2013 (S.Y SEM III)
Examination November / December 2025
Physics -VIII Modern and Nuclear Physics



[Time: 1:30 Hours]

[Max. Marks: 50]

Please check whether you have got the right question paper.

N. B

1. Attempt all questions.
2. Use of logarithmic table and electronic pocket calculator is allowed.

- Q1**
- A. On the basis of Richardson and Compton experiment, obtain relation between velocity of photo electron and frequency of light. **10**
- B. What is X-ray spectra? Explain Continuous X-ray spectra and give its main features. **10**

OR

- A. What is fission? What is its importance in generation of nuclear energy. **10**
- B. Explain the principle, construction and working of Ionization chamber. **10**

- Q2**
- A. Write a note on photo conductive cell with diagram. **05**
- B. Calculate the momentum of photon corresponding to the minimum wavelength emitted from X-ray tube whose operating voltage is 120 KV.
($C = 3 \times 10^8 \text{ m/s}$; $h = 6.62 \times 10^{-34} \text{ J-s}$; $e = 9.11 \times 10^{-31} \text{ kg}$) **05**

- C. Write a note on Nuclear Binding Energy. **05**
- D. A cyclotron in which the flux density is 1.4 weber/m² is employed to accelerate proton. How rapidly should the electric field between the dees be reversed?
Mass of proton = $1.67 \times 10^{-27} \text{ kg}$
Charge = $1.6 \times 10^{-19} \text{ C}$ **05**

OR

- A. Calculate the work function of sodium in electron volts if the threshold wavelength is 6625 Å and $h = 6.626 \times 10^{-34} \text{ J-s}$ **05**
- B. Write a short note on Bragg's Law in X-ray diffraction. **05**
- C. Find the binding energy of a deuteron formed by a proton and neutron. **05**
Mass of proton = 1.007276 a.m.u
Mass of neutron = 1.008665 a.m.u.
Mass of deuteron nucleus = 2.013553 a.m.u.
1 a.m.u. = 931 MeV
- D. With neat diagram, define the Van de-Graaff accelerator. **05**

Q3 Multiple Choice Questions

- Photo electrons can be ejected from the metal surface only when the incident radiation has _____ wavelength
(a) longer (b) shorter
(c) maximum (d) medium
- The electrons are ejected from the metal surface if the incident light has _____
(a) lower wavelength than cut-off wavelength
(b) higher frequency than threshold frequency
(c) only a
(d) both a and b
- In Bragg's law equation $2d \sin\theta = n\lambda$, n stands for _____
(a) order of the spectrum (b) phase of the spectrum
(c) angle of spectrum (d) none of these
- Laue's and Bragg's techniques are used for investigation of _____
(a) X-ray power (b) Binding energy
(c) Work function (d) Crystal structure
- Bragg's equation for the second order spectrum is _____
(a) $2d \sin\theta = \lambda$ (b) $2d \sin\theta = 3\lambda$
(c) $d \sin\theta = \lambda$ (d) All of the above
- Neutrons and protons are commonly known as _____
(a) Pions (b) Mesons
(c) Nucleons (d) Quarks
- If the effective neutron multiplication factor in the nuclear reactor is equal to one, then the chain reaction is _____
(a) Supercritical (b) Subcritical
(c) Critical (d) None of these
- The Reactor core, reactor moderator, reactor coolant and reactor shielding are the parts of the _____
(a) Proportional counter (b) Nuclear reactor
(c) Cyclotron (d) None of these
- In cyclotron, charged particles are accelerated by _____
(a) Magnetic field in the dees (b) Electrostatic deflector plates
(c) Electric field (d) None of these
- In the presence of magnetic field, the charged particles acquire _____ path
(a) Triangular (b) Cyclic
(c) Linear (d) Straight