Total No. of Printed Pages: 02

SUBJECT CODE NO:- 2022
FACULTY OF SCIENCE & TECHNOLOGY
B.Sc. S.Y Sem-III
Examination March/April-2022 (To be held in June/July-2022)
Physics -VIII
Modern and Nuclear Physics

[Time: 1:53 Hours] **[Max. Marks:50]**

Please check whether you have got the right question paper.

N.B
i. Attempt all questions.
ii. Use all logarithmic table and electronic pocket calculator is allowed.

Q.1 a) Explain Richardson and Compton experiment to study the relation between velocity of photoelectrons and frequency of light. 10

b) Discuss in detail Bragg's X-ray spectrometer. 10

OR

a) Explain briefly liquid drop model of nucleus. 10
b) Discuss principal, construction and working of Linear Accelerator. 10

Q.2 a) Write a short note on Binding Energy. 05

b) Calculate work function of sodium in electron volts if the three shold wavelength is $6800A^0$ and value of h is $6.625 \times 10^{-34} Js$ 05

c) Explain photo-emissive cell. 05

d) Calculate the binding energy of α-particle and express result in both MeV and joule. Given that mass of proton is 1.0072 76 u and mass of neutron is 1.008665.u 05

OR

a) Discuss absorption of x-rays. 05

b) The interplaner spacing for a given (h,k,l) planes of a crystal is 2.82 A^0. It is found that the first order reflection occurs at an angle of 10^0. What is the wavelength of x-rays? 05

c) Describe synchrocyclotron 05

d) A cyclotron in which the flux density is 1.4 wb/m^2 is employed to accelerate protons. How 05

rapidly should the electric field between the dees are reversed? Given that mass of the proton is $1.67 \times 10^{-27}\ kg$ and the charge is $1.6 \times 10^{-19} C$

Q.3 Multiple choice questions 10

1) The photo-multiplier cell based on the principle of -------
   a) Secondary emission
   b) Absorbtion
   c) Primary emission
   d) None of these

2) The process of emission of electrons from emitter plate, when elluminated by light of suitable wave length is called as ------
   a) Pieze electric effect
   b) Photo electric effect
   c) Thermionic emission
   d) None of above

3) Who discovered X-rays?
   a) Newton
   b) Einstien
   c) Roentgen
   d) Planck

4) What is unit of x-rays intensity?
   a) Candela
   b) Coulomb
   c) Roentgen
   d) None of these

5) One (1) a.m.u is equal to
   a) $1.66 \times 10^{-25} kg$
   b) $1.66 \times 10^{-20} kg$
   c) $1.66 \times 10^{-27} kg$
   d) None of above

6) Which of the following force is strong force?
   a) Gravitational
   b) Nuclear
   c) Electrostatic
   d) Magnetic

7) The energy which an electron aquires when accelerated through a potential difference of 1 volt is known as
   a) 1 electron volt
   b) 1 erg
   c) 1 joule
   d) 1 watt

8) A cyclotron uses two dees while there is only ---------- dee in a synchrocyclotron
   a) Two
   b) Three
   c) One
   d) Four

9) The minimum energy required to remove an electron with zero velocity is
   a) Stopping potential
   b) Binding energy
   c) Work function
   d) None of above

10) Which is Bragg's law?
   a) $n\lambda = 2 \sin\theta$
   b) $n\lambda = \sin\theta$
   c) $n\lambda = 2d \sin\theta$
   d) $\frac{\lambda}{2} = d \sin^2\theta$