GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Basic Sciences

Bachelor of Science Honours in Physics
Semester End Examination - May 2024

Duration : 180 Minutes
Max Marks : 100

Sem VI - C1UD601T - Solid State and Nuclear Physics

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	A nucleus contains 20 neutrons and 19 protons and another nucleus contains 40 neutrons and 35 protons. Obtain the ratio between the radii of the two nucleuses.	K1 (3)
2)	Establish the relation between the half life and radioactive disintrigation constant.	K2 (4)
3)	Prove that the void space in FCC crystal is 26%.	K2 (6)
4)	Describe the van-der Wall bonds in Solids with example and write the properties of it.	K3 (6)
5)	Derive the q value during beta + decay.	K3 (6)
6)	Describe the Q-value of nuclear reaction.	K3 (9)
7)	Describe briefly about the nuclear fission process and give example.	K3 (9)
8)	Describe the Bragg's spectrometer with the help of a diagram. On which law the calculation is based.	K4 (8)
9)	Calculate the (i) mass defect, (ii) binding energy and (iii) the binding energy per nucleon for a $_{83}Bi^{209}$ nucleus. Nuclear mass of $_{83}Bi^{209}$ =208.980388a.m.u., mass of hydrogen nucleus =1.007825 a.m.u. and mass of neutron =1.008665 a.m.u. Given 1 a.m.u. =931 MeV.	K4 (12)
10)	Describe the principle of Laue's diffraction method. Explain the origin of Laue's spots.	K5 (10)
11)	Describe the construction and basic principle of Scintillation detectors and it's application.	K5 (15)
	OR	
	Describe the construction and basic principle of semiconductor detector and it's application.	K5 (15)
12)	Prove that the nuclear shape is spherical, oblate spheroid and prolate spheroid.	K6 (12)
	OR	
	Derive the quadrupole moment of a nucleus.	K6 (12)