

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2023)

CLASS: BTECH
BRANCH: BT/CHEMICAL/MECH/PROD/CSE/EEE/ECE

SEMESTER : VI
SESSION : SP/2023

SUBJECT: PH318 INTRODUCTION TO NUCLEAR AND PARTICLE PHYSICS (OPEN ELECTIVE)
TIME: 02 Hours FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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		CO	BL
Q.1(a)	What is binding energy of a nucleus?	[2] 1	I
Q.1(b)	Determine the radii of a O^{16} and a Pb^{206} nucleus, given that $R_0=1.4$ fm.	[3] 1	V
Q.2(a)	Discuss the general characteristic of the nuclear forces.	[2] 1	VI
Q.2(b)	A narrow beam of singly charged B^{10} and B^{11} ions of energy 3.2 KeV passes through a slit of width 1 mm into a uniform magnetic field of 1200 gauss and after a deviation of 180° the ions are recorded on a photographic plate. (1) What is the spatial separation of the images? (2) What is the mass resolution of the system?	[3] 1	I
Q.3(a)	What are magic numbers?	[2] 1	I
Q.3(b)	Explain single particle shell model which predicts the magic numbers.	[3] 1	V
Q.4(a)	Name important properties of α -rays.	[2] 2	I
Q.4(b)	A radio-active nuclide emits an α particle of energy E_α . Evaluate the corresponding disintegration energy of the α particle.	[3] 2	V
Q.5(a)	What are the properties of β -rays.	[2] 2	I
Q.5(b)	Explain how the theory of β -decay accounted for the existence of neutrino and antineutrino?	[3] 2	V

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