

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)

CLASS: IMSc  
BRANCH: PHYSICS

SEMESTER :VI  
SESSION : SP/2023

SUBJECT:PH318 INTRODUCTION TO NUCLEAR AND PARTICLE PHYSICS

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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		CO	BL
Q.1(a)	What is binding energy of nucleus ? Draw a curve indicating variation of binding energy per nucleon as a function of mass number of nuclei.	[5] I	I
Q.1(b)	Singly charged Lithium ion, liberated from a heated anode, are accelerated by a difference of 623 volts between anode and cathode. They then pass through a hole in the cathode into a uniform magnetic field perpendicular to their direction of motions. The magnetic flux density is $0.1 \text{ Wb/m}^2$ and the radii of the paths of the ions are 8.83 cm and 9.54 cm respectively. Estimate the mass number of the lithium isotope.	[5] I	VI
Q.2(a)	Define Q- value and threshold energy for nuclear reaction.	[5] II	I
Q.2(b)	Develop an expression for non-relativistic Q value.	[5] II	VI
Q.3(a)	Explain the working of Geiger Muller counter.	[5] III	II
Q.3(b)	How is quenching achieved in Geiger counter.	[5] III	I
Q.4(a)	Explain the construction and theory of cyclotron.	[5] IV	II
Q.4(b)	Estimate the frequency of applied potential to the cyclotron dees in which deuterons are accelerated, given $B= 3.0 \text{ weber/m}^2$ , $e=1.6 \times 10^{19}$ and $1\text{a.m.u}=1.66 \times 10^{-27}$ .	[5] IV	V
Q.5(a)	Write a short note on the classification of elementary particle.	[5] V	IV
Q.5(b)	What are Baryons and Leptons?	[5] V	I

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