



AD-3215

Third Year B. Sc. (Sem. VI) Examination

March/April – 2015

Atomic & Nuclear Physics : Paper - VIII

Time : 2 Hours]

[Total Marks : 50

Instructions :

(1)

नीचे दृष्टावेक निशानीवाणी विगतो उत्तरवडी पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
THIRD YEAR B. SC. (SEM. VI)	<input type="text"/>
Name of the Subject :	<input type="text"/>
ATOMIC & NUCLEAR PHYSICS : PAPER - VIII	<input type="text"/>
Subject Code No. : <input type="text"/> 3 <input type="text"/> 2 <input type="text"/> 1 <input type="text"/> 5	<input type="text"/>
Section No. (1, 2,.....): Nil	<input type="text"/>
	Student's Signature

- (2) All symbols have their usual meanings.
- (3) Draw neat diagram wherever necessary.
- (4) Figures on the right indicate full marks.

1 Answer the following in brief :

8

- (1) What are the limitations of Bohr's model of an atom?
- (2) Which quantum numbers are associated with vector atom model?
- (3) An electron is in the $n=3, l=2$ state of hydrogen. What is the length of electronic angular momentum vector?
- (4) For a one electron atom or ion, spin-orbit coupling splits all states except s-states into doublets. Why are s-states exceptions to this rule?
- (5) For beta-decay process show that the neutrino must have zero charge.
- (6) How can one account for the fact that although electrons are not found inside the nucleus yet they are emitted by the nucleus during beta decay?
- (7) What are strange particles?
- (8) Name the quarks that combine to form a proton and a neutron.

- 2 (a) What is electron spin? How the concept of electron spin is useful in explaining anomalous Zeeman effect? 10
- OR**
- 2 (a) Explain Stern Gerlach experiment. 10
- 2 (b) On the basis of vector atom model find the possible values of the total angular momentum of electron. 4
- OR**
- 2 (b) Find the normal Zeeman splitting of the line 6438 Å in a magnetic field of 0.5 T. Given: charge of electron $e = 1.6 \times 10^{-19} \text{ C}$, mass of electron $m_e = 9.1 \times 10^{-31} \text{ kg}$ and speed of light $c = 3 \times 10^8 \text{ m/s}$. 4
- 3 (a) Describe Bragg's apparatus to determine the range of alpha particles. 10
- OR**
- 3 (a) Explain Kaufmann's experiment to determine e/m of beta particles. 10
- 3 (b) Explain origin of line and continuous beta ray spectra. 4
- OR**
- 3 (b) Explain origin of gamma rays. 4
- 4 Short Note : (Attempt any two) 14
- (1) Paschen Back effect
 - (2) Spin orbit coupling
 - (3) Coloured quarks and gluons
 - (4) Conservation laws and symmetry
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