

(i) Printed Pages : 3 Roll No.

(ii) Questions : 7

Sub. Code :

0	5	4	6
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Exam. Code :

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B.A./B.Sc. (General) 6th Semester
(2053)

PHYSICS

Paper-C : Nuclear and Particle Physics-II

Time Allowed : Three Hours]

[Maximum Marks : 44

Note :—(i) Attempt **FIVE** questions in all, selecting **TWO** each from Unit-I and II. Question No. 7 (Unit-III) is compulsory.

(ii) Use of Non-programmable calculator is allowed.

UNIT—I

1. (a) Derive Bethe Bloch formula for the energy loss of a heavy charged particle when it passes through the matter.

(b) Why Compton effect is not observed with white light ?

7,2

2. Explain the principle, construction and working of a GM counter. What is quenching and how it is done ? Give the concepts of dead time and recovery time.

9

3. (a) Explain Dirac theory of pair production.
(b) The absorption coefficient of lead for 1 MeV gamma rays is 0.75 cm^{-1} . Find the thickness of lead sheet required to reduce the gamma rays intensity by 50%.
(c) What is straggling ? Explain the reasons for straggling.

4,2,3

UNIT—II

4. (a) Explain the following properties of elementary particles :
(i) Lepton number
(ii) Hypercharge
(iii) Charge Conjugation.
(b) What are quarks ? Give their types and properties.
5. (a) Explain the construction and working of a linear accelerator.
(b) A cyclotron has magnetic field of 1.5 Wb/m^2 . The extraction radius is 0.5 m. Calculate the frequency of the radio beam necessary for accelerating deuterons and energy of the extracted beam. $m_d = 3.32 \times 10^{-27} \text{ Kg}$, $e = 1.6 \times 10^{-19} \text{ C}$.
(c) Why electrons can't be accelerated inside a cyclotron ?

5,2,2

6. (a) What are cosmic rays ? Give their origin and composition.
(b) What are strange particles ? Give two examples. What is strange quantum number ? 5,4

UNIT—III

7. Attempt any EIGHT parts :—

- (a) What is Bremsstrahlung ?
- (b) What is Cerenkov radiation ?
- (c) Give the limitations of Ionization chamber.
- (d) Why color has been assigned to quarks ?
- (e) Give the I_3 value for p (proton) and Ω .
- (f) What are Van Allen belts ?
- (g) What is Gell-Mann and Nishijima formula ?
- (h) Give the principle of Synchrotron.
- (i) What is the function of dynodes in a photomultiplier tube ?
- (j) Give two advantages of semi-conductor detectors.

1×8=8