(i) Printed Pages : 2 Roll No. .....

(ii) Questions : 7 Sub. Code : 0 5 4 6

Exam. Code : 0 0 0 6

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

(2040)

PHYSICS

Paper–C : Nuclear and Particle Physics–II

~~Time Allowed : Three Hours]~~ [Maximum Marks : 22

Note: Attempt 50% of Total Questions of Question Paper. Time: 2 Hours All will carry equal marks. Fraction will be lower digit.

~~(2) 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 ?

   3.5,1

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. 4.5

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 10%.

   (c) What is straggling ? Explain the reasons for straggling.

   2,1,1.5

UNIT–II

4. (a) Explain the following properties of elementary particles :
   (i) Baryon number
   (ii) Hypercharge
   (iii) Charge Conjugation.
   (b) What are quarks ? Give their types and properties.
   3,1.5

5. (a) Explain the construction and working of a Tandem accelerator.
   (b) A cyclotron has magnetic field of 1.5 Wb/m^2. The extraction radius is 0.5 m. Calculate the frequency of radio beam necessary for accelerating deuterons and energy of the extracted beam. $m_d = 3.32 \times 10^{-27}$ Kg, $e = 1.6 \times 10^{-19}$ C.
   (c) Why electrons can't be accelerated inside a cyclotron ?
   2.5,1,1

6. (a) What are cosmic rays ? Give their origin and composition.
   (b) What are strange particles ? Give two examples. What is strange quantum number ?
   2.5,2

UNIT–III

7. Attempt any **eight** parts :
   (a) What is Bremstrahlung ?
   (b) What is Cerenkov radiation ?
   (c) Give the limitations of Ionization chamber.
   (d) Why colour 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 Linear accelerator.
   (i) What is the function of dynodes in a photomultiplier tube ?
   (j) Give two advantages of semi-conductor detectors.
   $\frac{1}{2} \times 8 = 4$