

Exam. Code : 103206

Subject Code : 1438

B.A./B.Sc. 6th Semester

## PHYSICS PAPER-B (Radiation &amp; Particle Physics)

Time Allowed—3 Hours]

[Maximum Marks—35

**Note** :— All parts of question 1 in section A are compulsory. Attempt **ONE** question each from section B,C,D and E. All questions carry equal marks.

## SECTION-A

1. (a) Can a G.M. counter be used for energy spectroscopy? Justify your answer.
- (b) How the interaction of a gamma-ray with matter is different from that of a charged particle ?
- (c) What is the principle of a nuclear emulsion detector?
- (d) Why electrons cannot be accelerated in a cyclotron?
- (e) What is the advantage of colliding beam experiments over the fixed target experiments ?
- (f) Which conservation law is violated in the following particle interactions ?
  - (i)  $e^+ + e^- \rightarrow \mu^+ + \mu^-$
  - (ii)  $\Lambda^0 \rightarrow \pi^0 + \pi^0$
- (g) How an antiparticle is different from its particle ?  
Give an example. 7×1=7

**SECTION-B**

2. Write notes on the following :
- (i) Electron-positron annihilation
  - (ii) Stopping power
  - (iii) Straggling. 3+2+2
3. Discuss the three main processes by which gamma-radiations lose energy while passing through matter. 7

**SECTION-C**

4. Compare the working of scintillation detector and semiconductor detector. What are their advantages and disadvantages? 7
5. Explain the principle and working of a G.M. counter. How a proportional counter is different from a G.M. counter? 7

**SECTION-D**

6. Describe the principle, construction and working of a cyclotron. What is the advantage of synchrocyclotron over cyclotron? 7
7. Discuss the principle, construction and working of a linear accelerator. 7



**SECTION-E**

8. Classify the various elementary particles on the basis of their properties. 7
9. Explain the four fundamental interactions of particles and compare their relative strength and range. 7