

**P-113**

Total Pages : 3

Roll No. ....

# **MSCPH-558**

## **Particle Physics**

M.Sc. Physics (MSCPH)

4th Semester Examination, 2023 (June)

**Time : 2 Hours]**

**Max. Marks : 70**

**Note :** This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein. Candidates should limit their answer to the questions on the given answer sheet. No additional (B) answer sheet will be issued.

### **SECTION–A**

#### **(Long Answer Type Questions)**

**Note :** Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

- 1.** What are elementary particles? Discuss their classification in details.

2. Discuss briefly iso-spin and strangeness. Describe how many mesons were classified into an octet, draw the octet diagram and give the quark content of these mesons.
3. Explain complete weight diagram for the (1,0), (0,1), (3,0), (1,1), (2,1) representation of SU(3).
4. Explain the dimensionality of the representation of SU(N) and multiplets of SU(N-1).
5. Describe Geiger-Muller Counter and explain its working as a particle detector.

## SECTION-B

### (Short Answer Type Questions)

**Note :** Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. Which of the following reactions can occur? State the conservation laws violated
  - (a)  $\Lambda^0 \rightarrow \pi^+ + \pi^-$
  - (b)  $p + p \rightarrow p + \Lambda^0 + \Sigma^+$
  - (c)  $p + \pi^- \rightarrow \Lambda^0 + K^0$
  - (d)  $e^+ + e^+ \rightarrow \mu^+ + \pi^-$

2. What is parity violation? Discuss briefly.
  3. Give the properties of strong and weak interactions of elementary particles.
  4. Write a short note on coloured quarks and gluons.
  5. Derive and explain Gell Mann Okubo Mass formula.
  6. What is meant by the approximate  $SU(3)$  symmetry of strong interaction? How is this broken?
  7. Describe general rule for reducing Kronecker product of two representations.
  8. How is Cloud Chamber used to determine the energy of a particle passing through it?
-

