K-424

MSCPH-558

Particle Physics

M.Sc. Physics (MSCPH)

4th Semester Examination, 2023 (Dec.)

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 answers 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. Elaborate the conservation laws governing elementary particles with examples.

2. What is Quark model? What are different types of quarks and their properties?

3. Discuss the Unitary symmetry [SU(2)] and Eightfold way [SU(3)] symmetry in details.

4. Discuss Kronecker product of three particle state vectors in details.

5. Give an account of the mode of operation of a Scintillation Counter and describe how it may be utilized in the study of nuclear reaction.

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) $p + p \rightarrow n + p + \pi^+$

    (b) $\pi^- + p \rightarrow n + \pi^0$

    (c) $p + \bar{v}_e \rightarrow n + \mu^+$

    (d) $p + \bar{v}_e \rightarrow n + e^+$

2. Discuss briefly iso-spin and strangeness.

3. Write a short note on CPT invariance of elementary particles.

4. Describe the fundamental differences between baryons and mesons.

5. Explain weight diagram of fundamental representation of SU(2) generator.

6. Explain standard arrangements of Young tableaux.

7. What is meant by resolving time of a G.M. Counter? Deduce its expression.

8. Enumerate bubble Chamber advantages over the Cloud Chamber.

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