**Roll No.** | | | | | | | | | | | | | **Total No. of Pages : 02**

**Total No. of Questions : 11**

**M.Sc (Physics) (2018 Batch) (Sem.-3)**

# PARTICLE PHYSICS

**Subject Code : MSPH-533-18**

**M.Code : 76752**

**Time : 3 Hrs.** **Max. Marks : 70**

**INSTRUCTIONS TO CANDIDATES :**

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SEVEN questions carrying FIVE marks each and students have to attempt any SIX questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

## SECTION-A

**1. Write briefly :**

(a) What are Fermions and bosons? Explain.

(b) What are pseudoscalar mesons?

(c) What do you mean by helicity of neutrino? Explain.

(d) "*Parity is not conserved in beta decay*". Comment.

(e) What are Dalitz plots? What are their uses?

(f) What do you mean by CP violation in K-decay?

(g) What is the difference between particles and antiparticles? Explain.

(h) What is the need for colour charge?

(i) What do you mean by Strangeness and Isospin? Explain.

(j) What are Madelstem variables?

## SECTION-B

2. Define Parity, charge conjugation and time reversal. State and explain CPT theorem.

3. The absorption of slow negative pion in deuterium leads to the following reaction : $\pi^- + d \rightarrow n + n$. Prove that the pion must be assigned odd parity.

4. Write a note on particles production at higher energies.

5. Show that the phase space volume element $\left(\frac{d^3p}{E}\right)$ is Lorentz invariant.

6. State which of the following reactions are allowed by the conservation laws and which are forbidden, and give the reason in either case :

   (a) $p \rightarrow n + e^+ + \nu_e$

   (b) $\mu^+ \rightarrow e^+ + e^- + e^+$

7. Show that in the two-nucleon system, deuteron is an isosinglet.

8. What are quarks? Explain the quark model.

## SECTION-C

9. Describe four fundamental interactions in nature. Discuss various conservation rules in fundamental interactions. Are all conservations rules are obeyed in all interactions? Comment.

10. Draw the Baryon Decuplet and explain using Strangeness and Isospin.

11. Define Cross-Section. Derive an expression for Breit-Wigner resonance formula.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student**.