

G-3/339/21

Roll No.....

III Semester Examination, April-2021

M.Sc.

PHYSICS

Paper I

(Nuclear and Particle Physics)

Time : 3 Hours]

[Maximum Marks : 80

Note : All questions are compulsory. Question Paper comprises of 3 sections. **Section A** is objective type/Multiple Choice questions with no internal choice. **Section B** is short answer type with internal choice. **Section C** is long answer type with internal choice.

SECTION 'A'

(Objective Type Questions)

Choose the correct answer :

1 × 8 = 8

1. α -ray spectra is :

- (a) discrete (b) continuous
(c) both (a) and (b) (d) None of these

2. Parity is not conserved in :

- (a) α -decay (b) β -decay
(c) γ -decay (d) none of these

3. The neutrons with energies above 1.2 MeV are called :

- (a) slow neutrons (b) fast neutrons
(c) very fast neutrons (d) ultra fast neutrons

4. According to compound nucleus theory, the nuclear reaction isstep process.

- (a) One step (b) Two step
(c) Three step (d) Four step

P.T.O.

[2]

5. Cyclotron is used to accelerate.....

- (a) positive ions (b) negative ions
(c) neutral particles (d) both (a) and (b)

6. G.M. counter cannot detect the :

- (a) protons (b) α -particles
(c) β -particles (d) Neutrons

7. Which is Boson ?

- (a) Electron (b) Positron
(c) Photon (d) Muon

8. The baryon number (B) of neutron is :

- (a) 0 (b) 1
(c) -1 (d) -2

SECTION 'B'
(Short Answer Type Questions)

6 × 4 = 24

Note : Answer the following questions in 250 words.

1. Explain the decay schemes in nuclides.

Or

Explain the Gamow theory of α -particles.

2. Deduce the expression for Q-value of a nuclear reaction.

Or

Derive the expression for differential reaction cross section.

3. Obtain the relation for betatron condition.

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Or

Compare the proportional counter and G.M. counter.

4. Give the conservation laws in elementary particles.

Or

Explain CPT theorem.

SECTION 'C'
(Long Answer Type Questions)

12 × 4 = 48

Note : Answer the following questions in 500 words.

1. Discuss the Fermi theory of β -decay.

Or

Describe the measurement of α -particle energy.

2. Explain partial wave analysis for nuclear reactions cross-section.

Or

Derive the Breit-Wigner dispersion formula for resonance cross-section.

3. Describe the scintillation counter.

Or

Give an account of the principle of cyclotron. Hence find the maximum energy attained by this device.

4. Discuss the Quark theory.

Or

Explain the different types of symmetry in elementary particles.

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