

Roll No. :

Total No. of Questions : 11]

[Total No. of Printed Pages : 3

BFMS-455

M.Sc. (Final) Examination, 2023

PHYSICS

Paper - VI

(Nuclear and Particle Physics)

Time : 3 Hours]

[Maximum Marks : 75

Section-A

(Marks : 2 × 10 = 20)

Note :- Answer all *ten* questions (Answer limit **50** words). Each question carries **2** marks.

Section-B

(Marks : 5 × 5 = 25)

Note :- Answer all *five* questions. Each question has internal choice (Answer limit **200** words). Each question carries **5** marks.

Section-C

(Marks : 10 × 3 = 30)

Note :- Answer any *three* questions out of five (Answer limit **500** words). Each question carries **10** marks.

Section-A

1. (i) Give *two* similarities between $n-n$ and $p-p$ forces.
- (ii) What is Q-value for Endoergic Reaction ?
- (iii) What is nuclear spin and parity for ground state of O^{17} ?

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- (iv) What are differences between Liquid Drop and Nucleus ?
- (v) Define Electron Capture.
- (vi) Write selection rules for gamma radiation.
- (vii) Briefly discuss about neutron detector.
- (viii) If paralysis time of a G.M. tube is 400 μ sec, what is the true count rate for measured count rate of 100 counts per minute ?
- (ix) What is CP-Inversion ? Give example of its violation.
- (x) What are Hadrons ? Give their examples.

Section-B

2. Explain Meson theory of nuclear forces.

Or

Explain partial wave analysis of reaction cross-section.

3. Define magnetic moment of nucleus and explain Schmidt lines.

Or

What is Magic Number ? Give evidences for the existence of Magic Numbers.

4. Give selection rules for β -decay.

Or

Explain angular correlation in gamma emission.

5. Give the principle of ionization gas filled detection and explain multiwire proportional counter.

Or

Write the theory and working of scintillation counter.

6. Discuss unitary symmetry and explain Baryon Octet.

Or

Define Isospin, hypercharge and strangeness and explain their conservation laws.

Section-C

7. Define the scattering cross-section. Obtain scattering cross-section of $n-p$ scattering at low energy.
8. Explain different nuclear energy term and give nuclear mass using semi-empirical mass formula.
9. Write short notes on the following :
 - (a) Internal Conversion
 - (b) Nuclear Isomerism
10. Explain working of GM counter and discuss quenching process and dead time for it.
11. What is high energy particle detector ? Give principle and working Cerenkov counter.