This question paper contains **2** printed pages]

NEPWT—79—2024

FACULTY OF SCIENCE

M.Sc. (NEP) (Second Year) (Third Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

PHYSICS

SPHYC-502

(Nuclear and Particle Physics)

(Thursday, 12-12-2024) **Time : 2.00 p.m. to 5.00 p.m.**

Time—3 *Hours* *Maximum Marks*—80

N.B. :— (1) Q. No. **1** is compulsory.

(2) Attempt any *three* questions from Q. Nos. **2** to **6**.

(3) *All* questions carry equal marks.

(4) Symbols have their usual meaning in the subject.

1. Solve the following questions : 20

(*a*) Explain mirror nuclei with suitable examples.

(*b*) Describe Semiconductor detector.

(*c*) Explain Bohr-Wheeler theory of fission process.

(*d*) Explain proton-proton cycle.

2. (*a*) Discuss of electric quadrupole moment of the nucleus. 10

(*b*) Discuss the semi-empirical mass formula for a nucleus and explain the different terms in it. 10

P.T.O.

3. (*a*) Derive the expression for the stopping power of heavy charged particles. 10

(*b*) Explain classification of elementary particles in detail. 10

4. (*a*) Write down the shell model configuration and assign for spin and parties to ground state of the nuclei : $_{28}Fe^{57}$, $_{30}Zn^{67}$, $_{21}Sc^{41}$. 10

(*b*) Explain the characteristics on Nuclear forces. 10

5. (*a*) Discuss law of successive transformation in detail. 10

(*b*) Discuss the C-N cycle. 10

6. Write short notes on the following : 20

(*a*) Average binding energy

(*b*) Quark theory

(*c*) Spin orbital coupling

(*d*) Neutrino hypothesis.