no. 3, establish the relation R + T = 1
when E<Vo
symbols have their usual meanings. 10

5. For a linear harmonic oscillator, establish the relation,

$$\Delta x\, \Delta p = \frac{1}{2}\hbar$$

for the ground state. 10

Or

6. Uncertanity product of the first exciated state of a linear haronic oscillator becomes $\frac{3}{2}\hbar$. Justify the statement. 10

7. (a) Write short notes on Binary star. 4
   (b) Explain the basic properties of a crab nebula. 5

Or

8. (a) Write short notes on Luninosities of star. 5
   (b) What is chondrashekan's limit. 5

9. Write short notes on :
   (a) Nuclear binding energy 7
   (b) Nuclear spin. 3

Or

10. Describe the following properties of nuclei: 2+4+4
   (a) Parity
   (b) Isospin
   (c) Magnetic dipole moment.

★★★

UG (CBCS) EVEN SEMESTER EXAMINATION, 2024

EDUCATION
(B.Sc. B.Ed.)

8th Semester

Course No. : BSPH – 801

(Cosmology and Nuclear Quantum Mechanics, Astrophysics)

Full Marks : 50
Pass Marks : 20

Time : 2 hours

The figures in the margin indicate full marks for the questions

(*Answer five questions*)

1. Prove that in quantum mechanics, energy eigen values are always real. 10

Or

2. Establish the following relation. 10

$$m\frac{d}{dt}\langle\hat{x}\rangle = \langle\hat{p}_x\rangle$$

3. Consider a step potential : 10

$$v(x) \begin{matrix} = 0 & x < 0 \\ = v_0 & x > 0 \end{matrix}$$

Establish the relation R+T = 1 when $E>V_0$ symbols have their usual meanings.

Or

4. For the same step potential as described in question