

HBTU Logo	Harcourt Butler Technical University, Kanpur		MID SEM (Even)
Branch	CS/IT/CE/ET/EE/ME	Program	B.Tech.
Course Name	Engineering Physics	Semester	II
Course Code	NPH-102	Year/Session	2025-26
Time: 1 hr		Max. Marks	15
Knowledge Level (KL)	K1: Remembering K2: Understanding	K3: Applying K4: Analysing	K5: Evaluating K6: Creating

Note: Answer all questions. Marks shown against each question.

Q. No	Questions	Marks	COs	KL
1	Write down the postulates of special theory of relativity.	2	CO1	K1
2	Establish the relation $E^2 = p^2 c^2 + m_0^2 c^4$. OR Derive addition of velocities theorem.	2	CO1	K4
3	What is the length of a meter stick moving parallel to its length when its mass is $3/2$ times of its rest mass?	2	CO1	K3
4	Describe the experiment by which we can demonstrate the wave particle duality phenomenon.	2	CO2	K2 K4
5	An electron is bound in one dimensional potential box which has width 2.5×10^{-10} m. Assuming the height of the box to be infinite. Calculate the lowest two permitted energy values of the electron. Given that: $m_e = 9.1 \times 10^{-31}$ kg, $h = 6.64 \times 10^{-34}$ Js.	2	CO2	K3
6	Show that $v_p \times v_g = c^2$ where v_p = wave velocity or phase velocity and v_g = group velocity.	2	CO2	K4
7(a)	On which frequency A. C. electricity works in India?	1	CO3	K2
7(b)	What is the role of least count while taking observation inside the laboratory?	1	CO2	K2
7(c)	What do you mean by monochromatic light?	1	CO4	K2