



MID TERM EXAMINATIONS – December 2023

Programme	: B.Tech.	Semester	: Fall Inter II 2023-24
Course Title/ Course Code	: Engineering Physics / PHY1001	Slot	: D21+D22+D23+D24+D25
Time	: 1 ½ hours	Max. Marks	: 50

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1		The universe is operating under the influence of four fundamental forces which are in nature. Explain these forces, and discuss their interaction domains.	10
2	(a)	Explain how Newton's laws of motion are not valid in non-inertial frame of reference with examples?	5
	(b)	Two particles of masses 1.0 kg and 2.0 kg are placed at a separation of 50 cm. Assuming that the only forces acting on the particles are their mutual gravitation, find the initial accelerations of the two particles.	5
3		Derive an equation that describes the time-dependent behaviour of a moving particle in quantum mechanics.	10
4	(a)	Calculate the de-Broglie wavelength associated with a proton moving with a velocity equal to $\frac{1}{20}$ velocity of light.	5
	(b)	Find the minimum energy of an electron moving in one dimension in an infinitely high potential box of width 1 Å. (Mass of the electron is 9.11×10^{-31} kg and $h = 6.63 \times 10^{-34}$ J/s)	5
5	(a)	Explain how do the surface plasmons responsible for the change in the optical properties of the material at the nanoscale? Explain briefly in terms of size and shape effect.	7
	(b)	Why is a high surface area to volume ratio important in nanoparticles?	3