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Mid-Term Examinations – October 2021			
Programme	: **B.Tech**	Semester	: **Fall 2021-22**
Course	: **Engineering Physics**	Code	: **PHY1001**
Faculty	: **Dr. Shweta Mukherjee**	Slot/ Class No.	: **F11+F12+F13/0009**
Time	: **1 ½ hours**	Max. Marks	: **50**

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks

1
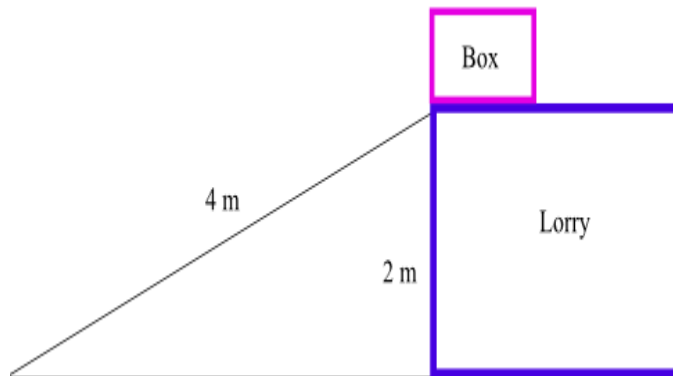
10

A 50 Kg box is to be lowered at constant speed down an inclined plane from the back of a lorry as shown in the figure. The coefficient of kinetic friction is equal to 0.5. What is the magnitude of the force F_a to be applied parallel to the inclined plane to hold back the box so that it is lowered at constant speed?

2 (a) A bullet of mass 10 g is fired horizontally into a 10 kg wooden block at rest on a horizontal surface. The coefficient of friction between the block and the surface is 0.1. Calculate the speed of the bullet striking the block, if the combination moves 10m before coming to rest **5**

(b) A 1 kg bomb is exploded in three parts having mass ratio 1:1:3. Parts having same mass move in perpendicular directions with velocity 30m/s. Determine the velocity of bigger part. **5**

3 A particle is moving in one dimensional box described by

$\quad\quad V = 0$ for $0 < x < L$

$\quad\quad V = \infty$ for $0 \geq x$ and $x \geq L$

Write and solve its Schrodinger's wave equation and obtain eigen value and eigen function. **10**

4 Calculate the energy difference between the ground state and the first excited **10**

state for an electron in one dimensional rigid box of length 10^{-8}cm. Also find the first three eigen functions.

5   i) Gordon E. Moore cofounder of Intel made one prediction which is known as Moore's Law. What was that? Is Moore's law still relevant?   **10**
ii) How surface to volume ratio affects the behaviour of materials. Explain with the example.

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