Reg. No.:

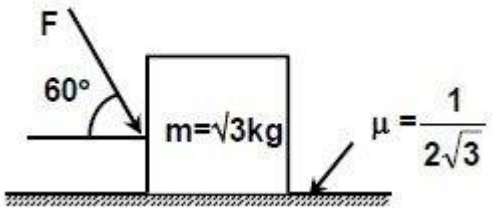
Name :

VIT® BHOPAL
www.vitbhopal.ac.in

Mid-Term Examinations – October 2021

Programme	:	**B.Tech**	Semester	:	**Fall 2021-22**
Course	:	**Engineering Physics**	Code	:	**PHY1001**
Faculty	:	**Dr. Shweta Mukherjee**	Slot/ Class No.	:	**D11+D12+D13/0008**
Time	:	**1 ½ hours**	Max. Marks	:	**50**

Answer all the Questions

Q.No.	Sub. Sec.	Question Description	Marks
1	(a)	Two bodies A and B of masses 5 kg and 10 kg in contact with each other rest on a table against a rigid wall. The coefficient of friction between the bodies and the table is 0.15.A force of 200N is applied horizontally at A. What are i) The reaction of the wall? ii) The action, reaction forces between A and B? iii) What happens when the wall is removed? iv) Does the answer to ii) change, when the bodies are in motion? v) Draw a free body diagram showing all the cases Ignore the difference between μ_s and μ_k.	**10**
	(b)	 Determine the maximum value of the force F such that the block shown in the arrangement above, does not move	**5**
2		A machine gun has a mass of 20kg. It fires 35g bullets at the rate of 400 bullets per minute with a speed of 400m/s. What force must be applied to the gun to keep it in position	**5**
3		How phase velocity is related to group velocity? Deduce the relation and show that in the absence of dispersion phase velocity is equal to group velocity for	**10**
4		A particle is trapped in a one dimensional box of length 'β'. The wave function associated with the particle is given by $\Psi(x) = \sqrt{\frac{2}{\beta}}\sin\frac{\pi x}{\beta}$. Calculate the probability of finding the particle between β/5<x<β/2	**10**
5		When we enter the nanoparticle paradigm physical and chemical properties change. Discuss the properties of nanoparticles in detail.	**10**

⇔⇔⇔