

Name. _____		Printed Pages:01		
Student Admn. No.: _____				
School of Basic Science Summer Term Examination – July - August 2024 [Programme:B.Sc. Physics] [Semester:I][Batch:1st]				
Course Title: Mechanics		Max Marks: 100		
Course Code: C1UD102B		Time: 3 Hrs.		
Instructions:	1. All questions are compulsory. 2. Assume missing data suitably, if any.			
		K Level	COs	Marks
SECTION-A (15 Marks) 5 Marks each				
1.	A proton of rest mass 1.67×10^{-24} gm is moving with velocity $0.9 c$. Find its mass and momentum.	KL2	CO2	5
2.	Show that Lorentz transformations are superior to Galilean transformations	KL2	CO3	5
3.	Define Torque. Show that torque can be written as $\vec{\tau} = \vec{r} \times \vec{F}$.	KL2	CO1	5
SECTION-B(40 Marks) 10 Marks each				
4.	A rocket of mass 20 kg has 180 kg of fuel. The exhaust velocity of fuel is 1.60 km s^{-1} . Calculate the ultimate vertical speed gained by the rocket when the rate of consumption of fuel is 2 kg s^{-1} .	KL4	CO2	10
5.	Analyze that the work done around a closed path is zero if force is conservative.	KL4	CO3	10
6.	If two capillaries of radii r_1 and r_2 and length l_1 and l_2 are joined in series, derive an expression for the rate of flow of the liquid through the arrangement using Poiseuille's formula.	KL4	CO2	10
7.	Prove that $\frac{3}{\gamma} = \frac{1}{3K} + \frac{1}{\eta}$.	KL5	CO4	10
SECTION-C (45 Marks) 15 Marks each				
8.	What is reduced mass? Reduce two body problem to one body problem and obtain the equation of motion for equivalent one body problem for two masses.	KL6	CO3	15
9.	Find an expression for the moment of inertia of a rectangular solid bar of length l about an axis perpendicular to its length and passing through gravity.	KL6	CO2	15
10	What was the aim of Michelson-Morley experiment? Discuss Michelson-Morley experiment and obtain the expected fringe shift under classical assumptions. Explain how the negative results obtained therefrom are interpreted.	KL6	CO3	15