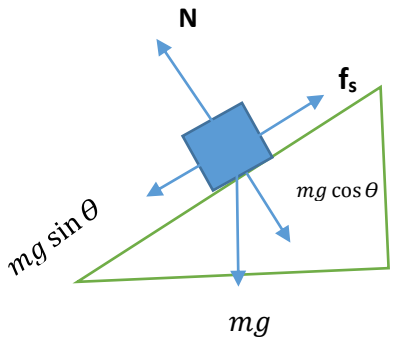
LAWS OF MOTION

***General Instructions*:** Answer all the questions. If you are unable to answer any question, go through the page number that is given against that particular question in the text book. You can find the answer.

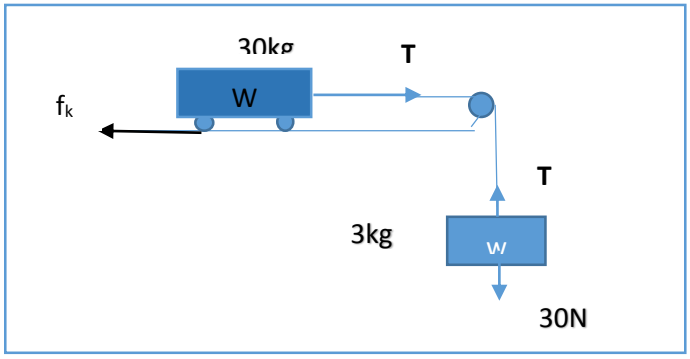
Test Paper-III

MAX MARKS: 30 **TIME: 90Mts**

1	A box lying in the compartment of an accelerating train is stationary relative to the train. Explain	P102	2
2	Determine the maximum acceleration of the train in which a box lying on its floor will remain stationary, given that the co-efficient of static friction between the box and the train's floor is 0.15.	P102	2
3	A mass of 4 kg rests on a horizontal plane. The plane is gradually inclined at an angle $\Theta = 15^{o}$ with the horizontal, the mass just begins to slide. What is the co-efficient of static friction between the block and the surface?	P102	2



4	What is the acceleration of the block and trolley system shown in fig, if the co-efficient of kinetic friction between trolley and the surface is 0.04? What is the tension in the string? (Take g=10ms^{-2}). Neglect the mass of the string.	P102	3



5	Why do a sphere rolling without slipping on a horizontal plane will suffer no friction. What are the values of kinetic friction and static friction in this situation?	P103	2
6	What are the different methods of reducing friction	P103	2
7	What is Centripetal force? Discuss the role of centripetal force in case of motion a car on a level road.	P104	3
8	Why banking of roads is required? Discuss the motion of a car on a banked road.	P104	3
9	A cyclist speeding at 18km/hr on a level road takes a sharp circular turn of radius 3m without reducing the speed. The co-efficient of static friction between the tyres and the road is 0.1. Will the cyclist slip while taking the turn?	P105	2
10	A circular race track of radius 300m is banked at an angle of 15^o. If the coefficient of friction between the wheels of a race-car and the road is 0.2, what is the (a) optimum speed of the race car to avoid wear and tear on its tyres, and (b) maximum permissible speed to avoid slipping?	P105	3
11	Define what is a free body diagram?	P106	1
12	A wooden block of mass 2 kg rests on a soft horizontal floor. When an iron cylinder of mass 25kg is placed on top of the block, the floor yields steadily and the block and the cylinder together go down with an acceleration of $0.1ms^{-2}$. What is the action of the block on the floor (a) before and (b) after the floor yields? Take g= 10 m s^{-2}.	P106	3
13	Identify the action-reaction pairs in the Q No 12. What important conclusion can be drawn from the above?	P107	2