Menoufia University
Faculty of Engineering-Shebin Elkom
Prod. Eng. & Mech. Design Department
First Semester Examination-2018/2019
Date of Exam: 10 /1/2019

Subject: Applied Mechanics
Code : PRE 117
Year : First Elect.Department
Time Allowed : 3 hours
Total Marks : 60 marks

Answer all the following questions:

Question No.1 (12 marks)

Draw the shear force and bending moment diagrams for the beam shown in Fig.(1).

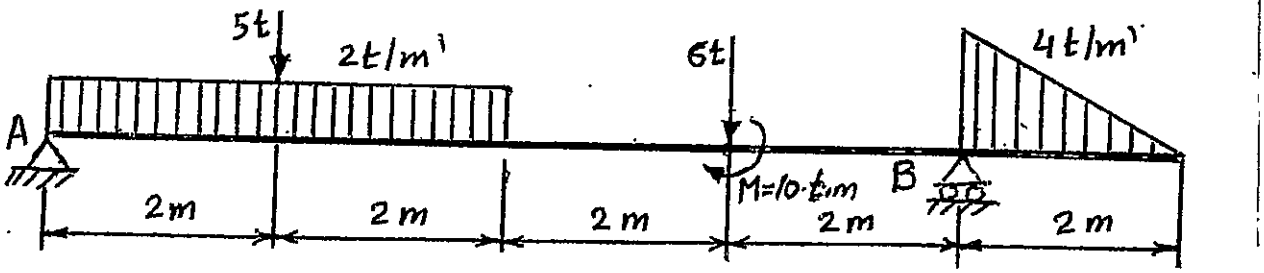

Fig. 1

Question No.2 (8 marks)

Two small balls A of mass 0.5 kg and B of mass 2 kg are moving with velocities and its directions as shown in Fig.2. When they collide together, determine their velocities just after the impact if the coefficient of restitution e= 0.8 . Also find the loss of kinetic energy due to the impact.

Question No. 3 (10 marks)

An airplane flies horizontally at velocity v_o = 250 km/hr when two parachutists jump out horizontally as shown in Fig.3 . Parachutist A weighs 800 N and pushes against the airplane with 1100 N force applied for 0.3 sec. Parachutist B weighs 900 N and jumps shortly after A, pushing with 1200 N force for 0.4 sec. What will be the final linear momentum of the airplane which weighs 30000 N without two parachutists.

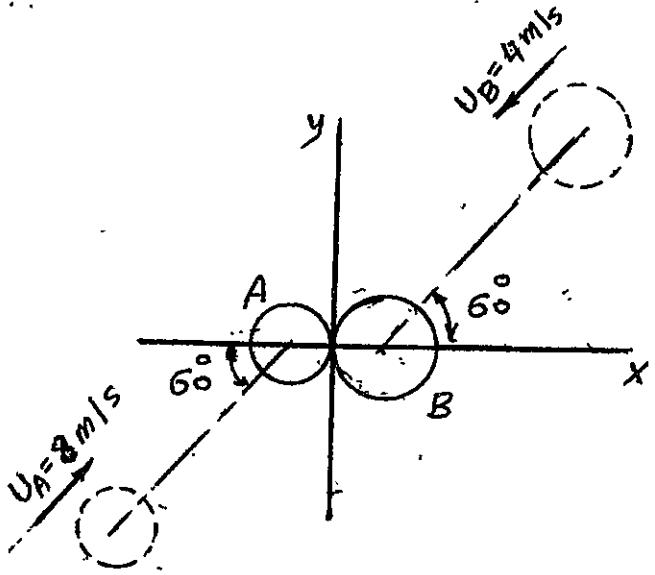

Fig. 2

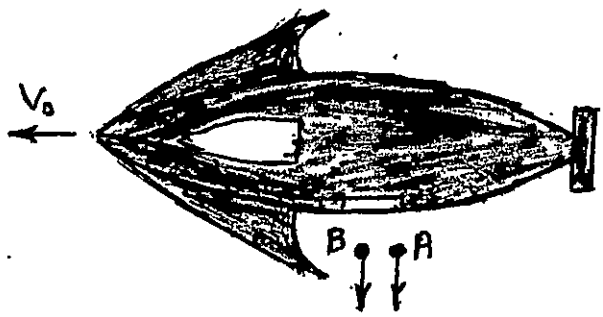

Fig. 3

Please see page no. 2

Question No. 4 (12 marks)

For the mechanism shown in Fig.4, the rod AB is subjected to a deceleration of 18 m/sec^2 when its velocity is 12 m/sec. At the instant shown in the figure, determine the angular velocity and angular acceleration of the link CD. Given:- CB=CD=20 cm, and $\theta = 60^\circ$.

Question No. 5 (10 marks)

A car of mass 2000 kg is traveling downhill (on inclined road), as shown in Fig.5, when the brakes are pushed to lock all the four wheels to stop rotating. If the car skidded to rest in 3 m, determine the normal and tangential forces on each wheel where the coefficient of friction $\mu = 0.6$. Assume symmetric left and right wheels.

Question No. 6 (8 marks)

For the vibrating system shown in Fig.6 , write down the equation of motion and hence find the natural frequency of the system. Given:-

m = 2 kg , k = 100 N/m , c = 80 N.s/m , a = 0.5 m and L = 1.2 m

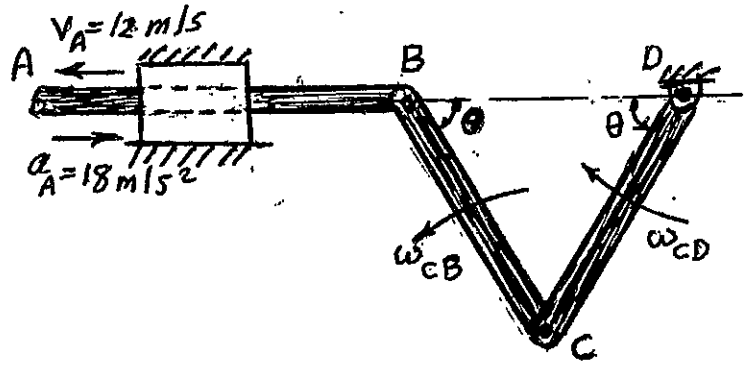

Fig. 4

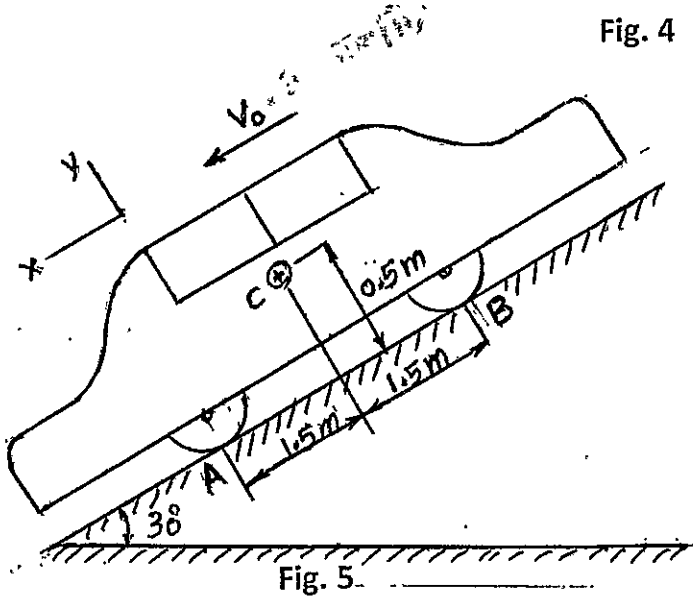

Fig. 5

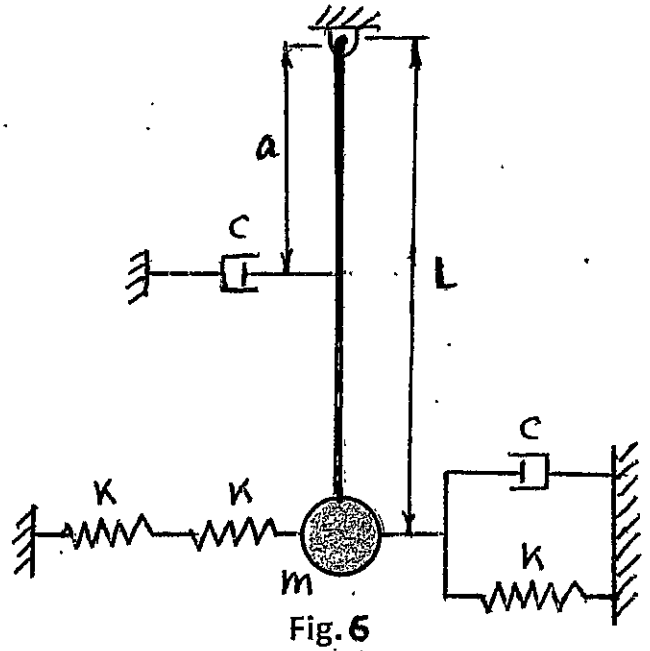

Fig. 6

GOOD LUCk

With our best wishes

This exam measures the following ILOs															
Question Number	Q2	Q3	Q4	Q6		Q1					Q6				
Skills	a15-2	a1-1	a15-2	a-4		b17-1					C13-1				
	Knowledge & Understanding Skills					Intellectual Skills					Professional Skills				