WALCHAND COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Vishrambag, Sangli – 416415

First Year B.Tech. Group A (ELN, CSE, IT)
ESE , ODD SEMESTER, AY 2022-23
Engineering Mechanics (6CV101)

ESE

PRN: _____

Day & Date: Friday, 03/03/2023 Time: 10.30 am to 12.30 pm

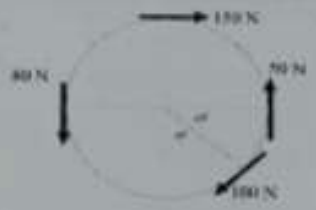
Max Marks: **50**

IMP: Verify that you have received question papers with correct course code, branch etc.

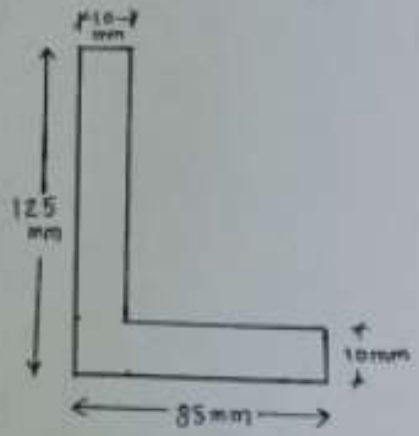
Instructions
a) All questions are compulsory.
b) Writing question number on answer book is compulsory otherwise answers may not be assessed.
c) Assume suitable data wherever necessary.
d) Figures to the right of question text indicate full marks.
e) Mobile phones, smart gadgets and programmable calculators are strictly prohibited.
f) Except PRN anything else writing on question paper is not allowed.
g) Exchange/Sharing of stationery, calculator etc. not allowed.

Text on the right of marks indicates course outcomes (Only for faculty use)

			Marks	
Q1	A)	State the assumptions made while making an analysis of a framed structure.	3	CO1
	B)	Determine the resultant of the four forces acting tangentially to a circle of radius 3 m as shown in figure. What will be the location of the resultant with respect to center of the circle?	6	CO1



	C)	Determine the moment of inertia of the L section as shown in fig.about its centroidal axes parallel to the legs.	6	CO2

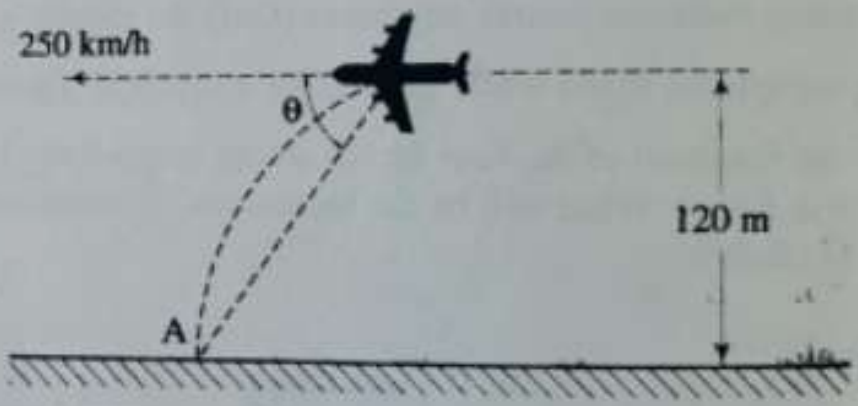


Q2 A) A train, starting from rest, is uniformly accelerated during the first 250 m of its run and runs next 750 m at uniform speed. It is then brought to rest in 50 seconds under uniform retardation. If the time taken for the entire journey is 5 minutes, then find the acceleration with which the train started. 5

B) Power supply was cut off to a power driven wheel when it was rotating at a speed of 900 rpm. It was observed to come to rest after making 360 revolutions. Determine its angular retardation and time it took to come to rest after power supply was cut off. 5

Q3 A) Calculate the super elevation of the rail on a curved track for a locomotive running at 60kmph, gauge and radius of the curvature being 1.68m and 800m respectively. Find the lateral thrust on the outer rail, if the speed of the locomotive is changed to 80kmph. Weight of the locomotive is 1000 kN. 5

B) The pilot of an airplane carrying a package of mail to a remote outpost wishes to release the package at the right moment to hit the recovery location A. What angle θ with the horizontal should the pilot's line of sight to the target make at the instant of release? The airplane is flying at an altitude of 120 m with a velocity of 250 kmph. 5



Q4 A) Define and explain

a) Direct and Indirect Impact

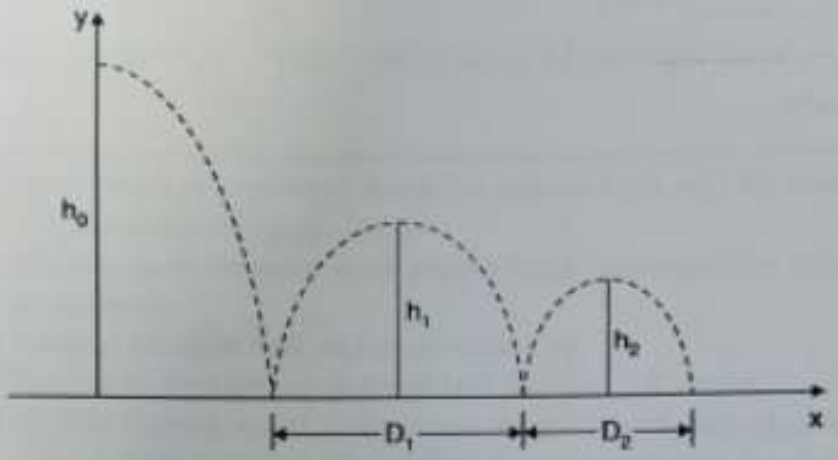
b) Law of Conservation of momentum. 5

B) A ball is dropped from a height $h_0 = 1.2$ m on a smooth floor as shown in figure below. Knowing that for the first bounce $h_1 = 1$ m and $D_1 = 0.4$ m. CO1

Determine

a) The coefficient of restitution

b) The height and the range of the second bounce



5

C) A glass marble, whose weight is 0.2 N, falls from a height of 10 m and rebounds to a height of 8 meters. Find the impulse and the average force between the marble and the floor, if the time during which they are in contact is $\frac{1}{10}$ of a second. CO3

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