



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:I/II
Class:FY	Program:B.Tech
Branch Code:FYE	Pattern:2022
Name of Course:Engineering Mechanics	Course Code:FYE221009
Max. Marks:60	Duration:2.30 Hrs.

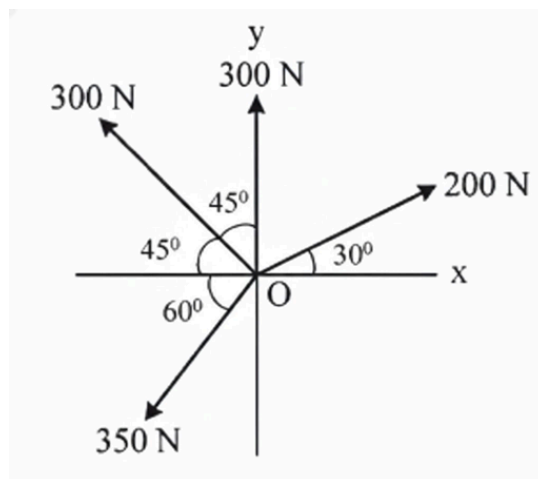
Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 05 pages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

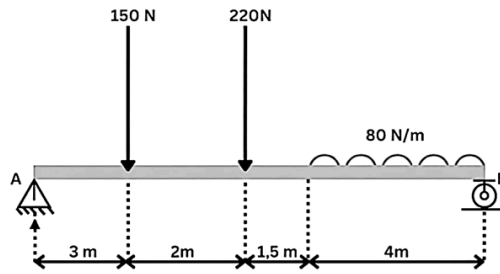
Question No. 1

- 1a) Find the magnitude of the resultant and its direction of the following forces acting at a point O as shown in fig. (6) CO1, CO2, CO3



Question No. 2

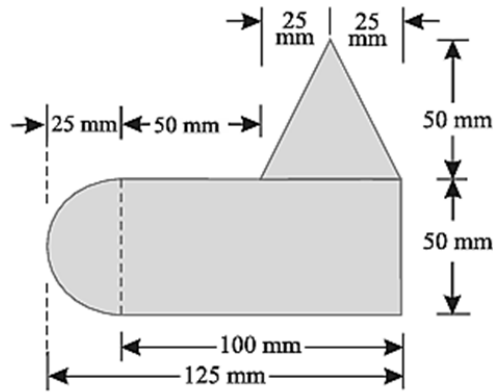
- 2a) Find support reaction at A and B for the beam AB as shown in fig. (6) CO1, CO2, CO3



Question No. 3

3a) Locate the centroid of the shaded region shown in fig.

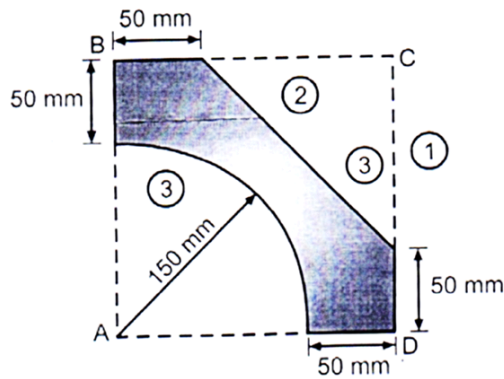
(8) CO1,
CO2,
CO4



OR

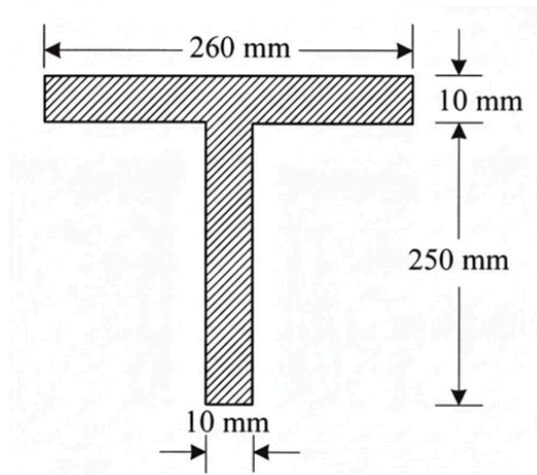
3b) Locate the centroid of the shaded region shown in fig.

(8) CO1,
CO2,
CO4



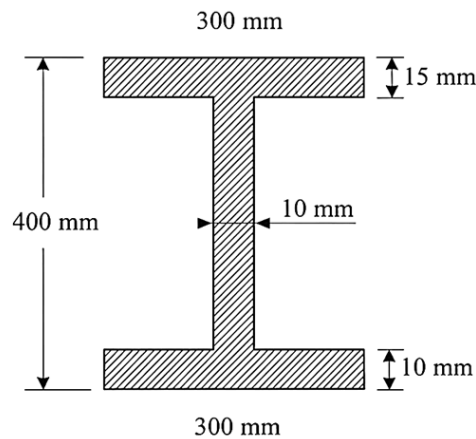
3c) Calculate Moment of Inertia for the fig. shown below with respect to X and Y axis.

(8) CO1,
CO2,
CO4



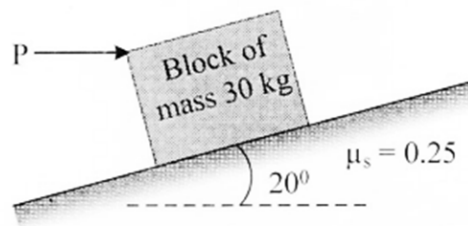
OR

- 3d) Calculate Moment of Inertia for the fig. shown below with respect to X axis. All dimensions are in mm. (8) CO1, CO2, CO4



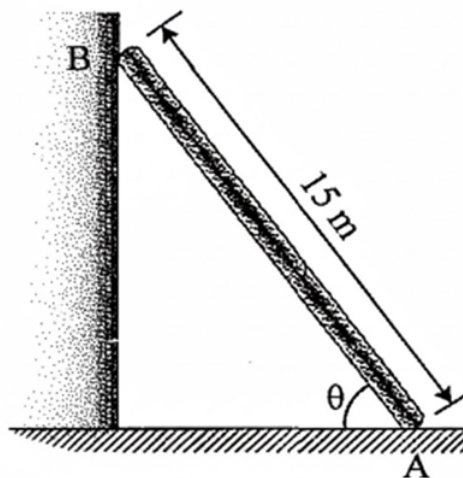
Question No. 4

- 4a) Determine the horizontal force P needed to just start moving the 30 kg block up the plane as shown in fig. Take $\mu_s = 0.25$ (8) CO1, CO2, CO3

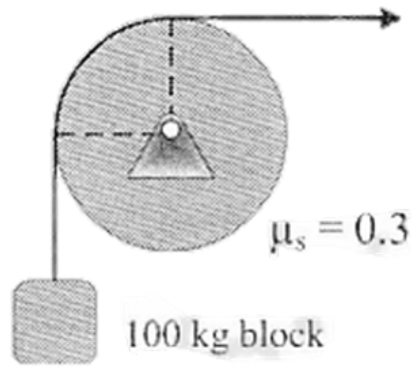


OR

- 4b) The 15 m ladder has a uniform weight of 80 N and rest against the smooth wall at B shown in Fig. (8) CO1, CO2, CO3
If the coefficient of statics friction at A is $\mu_A = 0.4$. Determine the smallest angle at which the ladder will not slip.

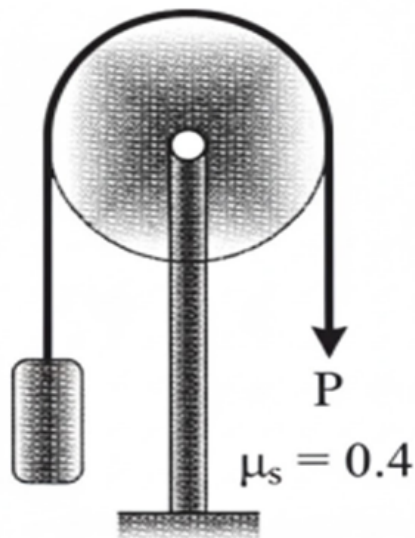


- 4c) A flexible cable which supports the 100 kg block is passed over a fixed circular drum shown in Fig. (8) CO1, CO2, CO3
subjected to a force P to maintain equilibrium. If the coefficient of friction between the cable and drum is $\mu_s = 0.3$, determine the range of P.



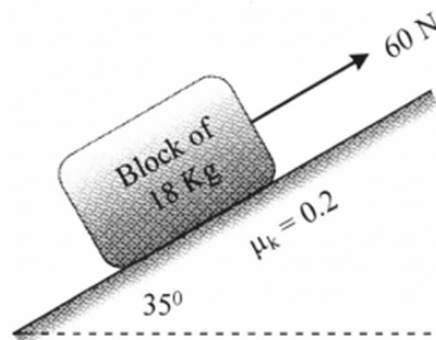
OR

- 4d) A cable is passing over the disc of belt friction apparatus at a lap angle 180° as shown in fig. If coefficient of static friction is 0.4 and the weight of the block is 500 N, determine the range of force P to maintain equilibrium. (8) CO1, CO2, CO3



Question No. 5

- 5a) Determine the work done by all forces acting on the block of 18 kg as shown in Fig. as it moves 12 m upwards along the plane. Take coefficient of kinetic friction $\mu_k = 0.2$. (8) CO1, CO2, CO3, CO5

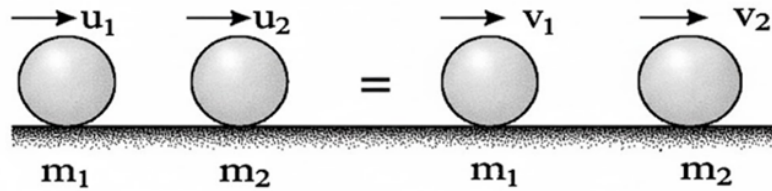


OR

- 5b) Disk A has a mass of 250 g and is sliding on a smooth horizontal surface with an initial velocity of 2 m/s. It makes direct collision with disk B, which has a mass of 175 g and is originally at rest as (8) CO1, CO2

shown in Fig If both disks are of the same size and the collision is perfectly elastic, determine the velocity of each disk just after collision.

CO3,
CO5



- 5c) A ball has a mass of 30 kg and is thrown upward with a speed of 15 m/s. Determine the time to attain maximum height using impulse momentum principle. Also find the maximum height.

(8) CO1,
CO2,
CO3,
CO5

OR

- 5d) Define following terms with neat sketch

(8) CO1,
CO2,
CO3,
CO5

- 1) Central impact
- 2) Direct impact
- 3) Oblique impact
- 4) Eccentric impact
- 5) Direct Central impact

..... End of question paper.....