

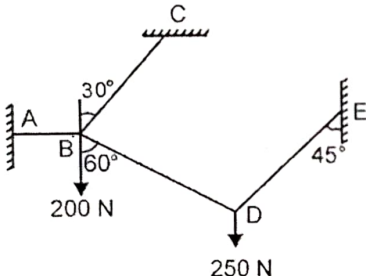
JAMIA HAMDARD
Department of Computer Science & Engineering
School of Engineering Science & Technology
B.Tech(CSE/ECE)
Even Semester Examination-2023
Course Code- BTCSE/BTECE -210
Course Title – Basic Engineering Mechanics

Roll No-

Time: 3 Hours

Max. Marks: 75

- Note: 1. Answer all **Seven** questions from Section A. Limit your answers to 20-40 words in this part.
2. Answer any **four** questions from Section -B.
3. Different parts of the same question are to be attempted adjacent to each other.
4. A non-Programmable Calculator is allowed.

		<u>SECTION –A (7x5 = 35 Marks)</u>	Marks	Course Outcomes	Blooms Taxonomy Level
Q1	(a)	State Varignon's theorem.	(2.5)	CO5	L1
	(b)	What do you mean by free body diagram?	(2.5)		L2
Q2		A system of connected flexible cables shown in Fig. 1. is supporting two vertical forces 200 N and 250 N at points B and D. Determine the forces in various segments of the cable  Figure 1	(5)	CO2	L3
Q3		Four forces having magnitudes of 200 N, 400 N, 600 N and 800 N respectively, are acting along the four sides (1 m each) of a	(5)	CO1	L3

square ABCD taken in order, as shown in Fig. 2. Determine the magnitude and direction of the resultant force

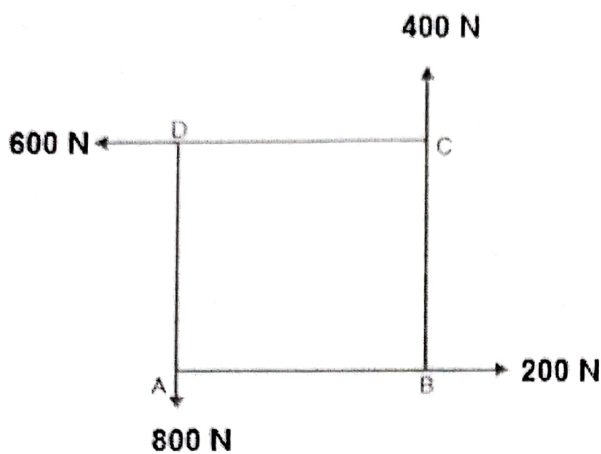


Figure 2

Q4 Find the forces in all the members of the truss shown in Fig.3

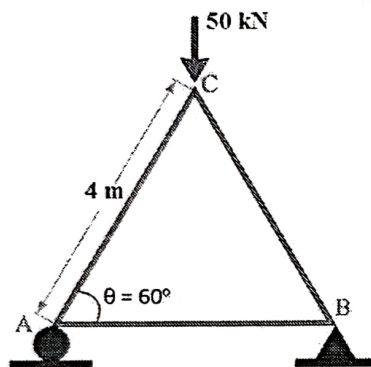


Figure 3

Q5 Block A weighing 1000 N rests over B which weights 2000 N as shown in following Fig. 4. Block A is tied to wall with a horizontal string. If the coefficient of friction between A and B is $\frac{1}{4}$ and between Band floor is $\frac{1}{3}$, what should be the value of P to move the bloc B if

- P is horizontal
- P acts 30° upwards to horizontal

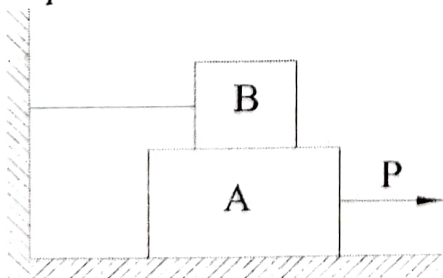


Figure 4

(5)

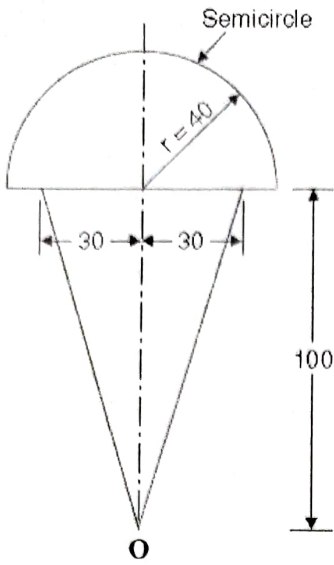
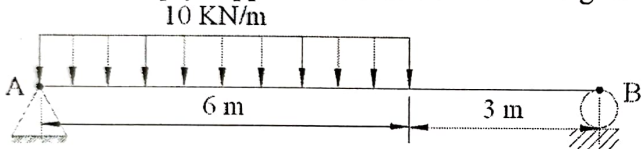
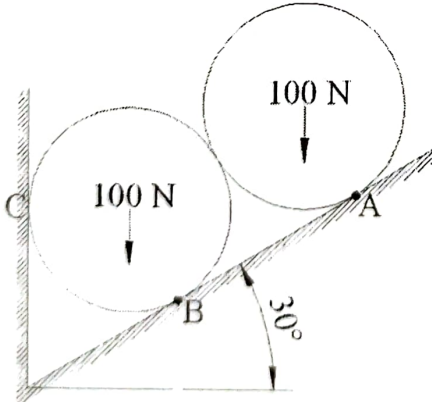
CO5

L3

(5)

CO3

L3

Q6	Determine the centroid of the area shown in Fig. 5 with respect to the axis passing through O shown.  Figure 5	(5)	CO4	L3
Q7	Determine the components of the support reactions at the support A and B on the simply supported beam as shown in Fig.6.  Figure 6	(5)	CO1	L3
SECTION-B (4x10 = 40 Marks)				
Q1	Two identical roller each of weight $W = 100 \text{ N}$ are supported by an inclined plane and a vertical wall as shown in Fig. 7. Find reaction at the point of support A, B & C. Assume all surface to be smooth.  Figure 7	(10)	CO2	L3
Q2	Derive the expression for the relationship between tight side and slack side forces in a belt friction $\frac{T_1}{T_2} = e^{\mu\theta}$	(10)	CO3	L2
Q3	Determine the forces in all the members of the truss shown in Fig. 8 and indicate the magnitude and nature of forces on the diagram	(10)	CO5	L3

of the truss. All inclined members are at 60° to horizontal and length of each member is 2 m.

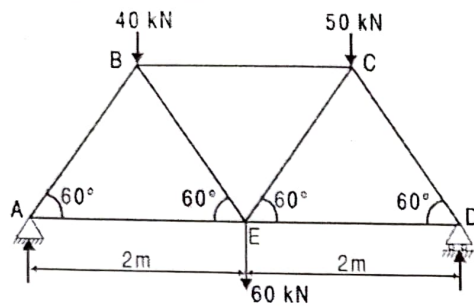


Figure 8

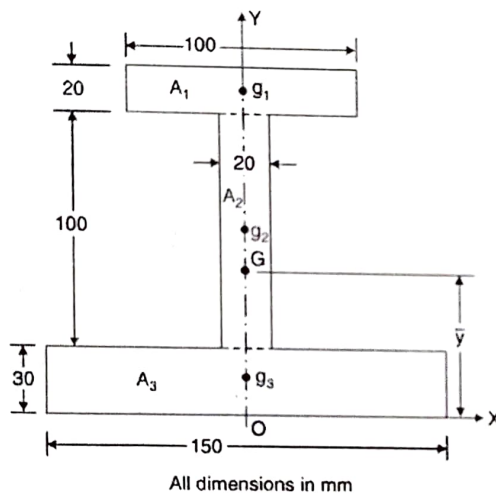
Q4 Derive the expression for moment of inertia of a circle about its Diametral.

(10)

CO4

L3

Q5 Locate the centroid of the I-section shown in Fig. 9



All dimensions in mm

Figure 9

(10)

CO4

L3

Q6 Two cylinders, A of weight 4000 N and B of weight 2000 N rest on smooth inclines as shown in Fig. 10. They are connected by a bar of negligible weight hinged to each cylinder at its geometric Centre by smooth pins. Find the force P to be applied as shown in the figure such that it will hold the system in given position

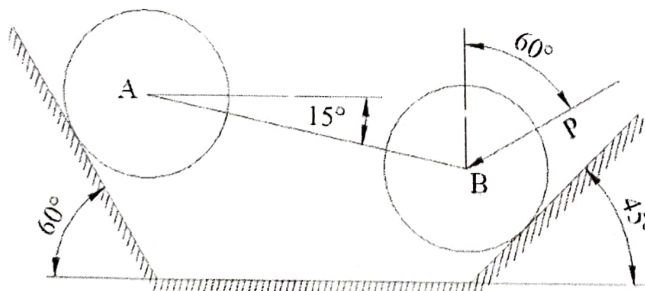


Figure 10

(10)

CO2

L3
