Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN											Course Code	2	2	C	I	V	2	3

First Semester B.E. Degree Examinations, April/May 2023

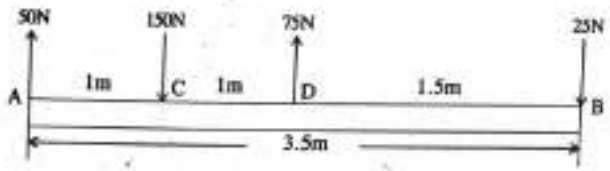
ENGINEERING MECHANICS

Duration: 3 hrs **Max. Marks: 100**

Note: ***1. Answer any* FIVE *full questions, choosing* ONE *full question from each module.***
2. Missing data, if any, may be suitably assumed

Q. No		*Questions*	*Marks*	*(RBTL:CO: PI)*
		MODULE – 1		
1.	a.	List and explain the classification of force system with a neat sketch.	08	2:1:1.4.1
	b.	Define the following terms a) Particle b) Continuum c) Force d) Rigid body e) Deformable body f) Equivalent force	06	2:1:1.4.1
	c.	Explain the principles of forces.	06	2:1:1.4.1
		OR		
2.	a.	Define couple and list the characteristics of couple.	08	2:1:1.4.1
	b.	A horizontal force of 1000N is acting on the lever AB. Find the equivalent system at the support B.	06	3:1:2.1.3

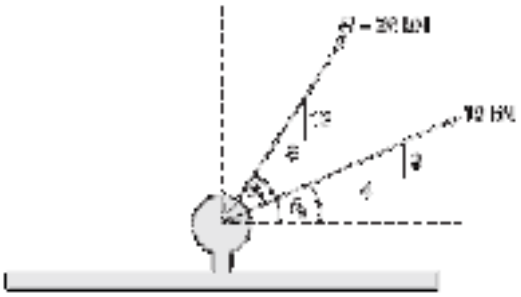
	c.	A System of forces are acting on a rigid bar as shown in figure reduce this system to a. A single force b. A single force & couple force at point A	06	3:1:2.1.3



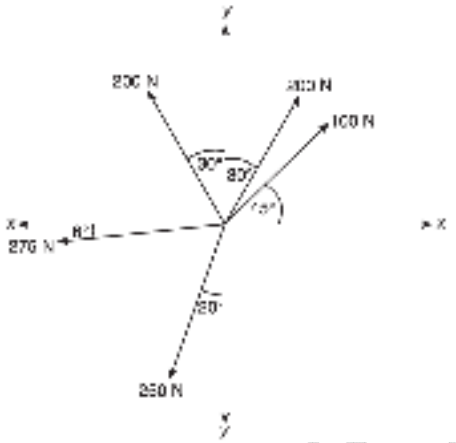
		MODULE – 2		
3.	a.	If the resultant of two concurrent forces P and 1.5P is √P, find the angle between the forces. What will be the angle made by the resultant with P?	06	3:2:2.1.3

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

b. 26 kN force is the resultant of the two forces, one of which is as shown in Figure Determine the other force. 08 3:2:2.1.3



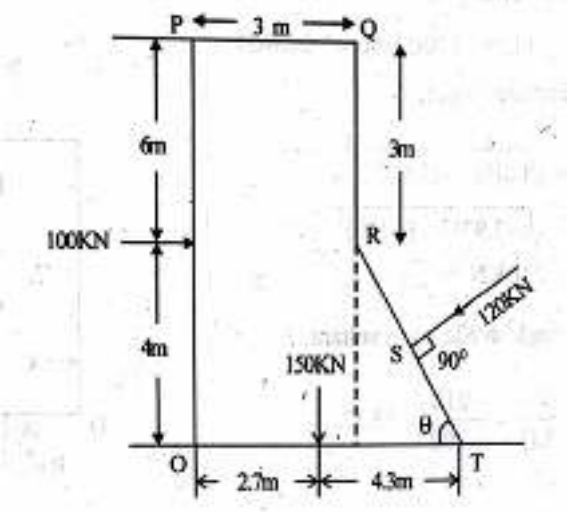
c. Five coplanar forces are acting at a point as shown in Figure. Determine the resultant in magnitude and direction. 06 3:2:2.1.3



OR

4. a. State and prove Varignon's theorem of moments. 10 3:2:2.1.3

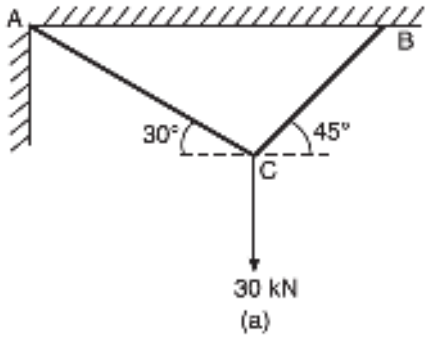
b. Find the magnitude, direction and X intercept of the resultant of the system of forces shown in fig below. 10 3:2:2.1.3



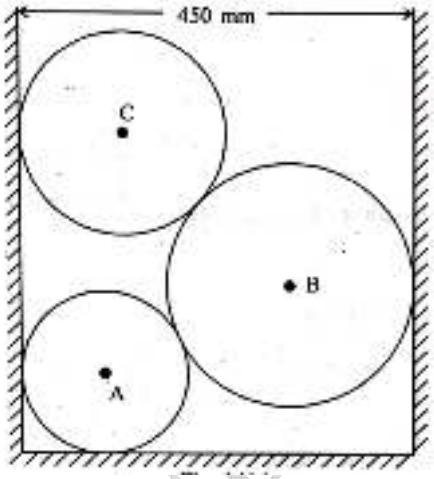
MODULE – 3

5. a. State and prove Lami's Theorem. 06 3:3:2.1.3

b. Two cables are connected at A and B as shown in Figure. A force of 30 kN is applied at C. Determine the forces in the cables CA and CB. 06 3:3:2.1.3

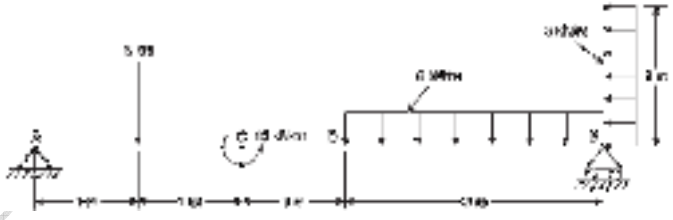


c. Three cylinders A, B and C of diameter 200 mm, 300 mm and 250 mm and weight 75 N, 200 N and · I 00 N respectively are placed in a ditch as shown in figure. Assuming contact surfaces smooth determine the reaction between cylinder A and vertical wall. 08 3:3:2.1.3



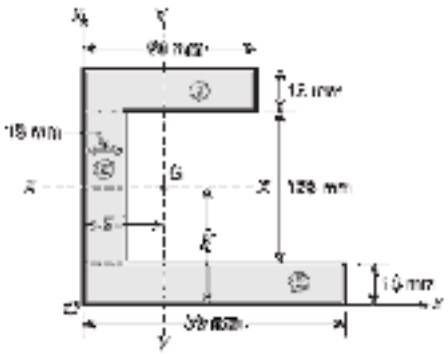
OR

6. a. With a neat sketch explain different types of beams and types of supports. 10 3:3:1.4.1
   b. Find the support reactions at A and B for the beam loaded as shown in Figure. 10 3:3:2.1.3



MODULE – 4

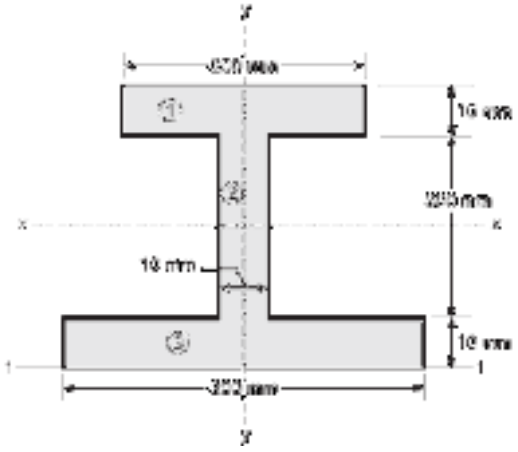
7. a. Derive an expression for centroid of a Semicircle of radius 'r'. 10 3:4:2.1.3
   b. Determine the centroid of Figure 10 3:4:2.1.3



Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator**)

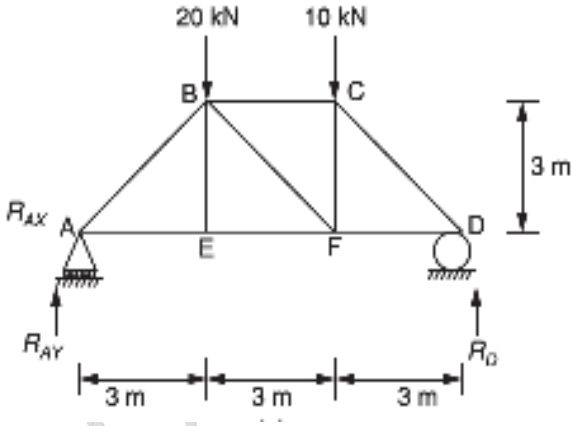
OR

8.	a.	Derive an expression for Moment Of Inertia of a Triangle.	10	3:4:2.1.3
	b.	Determine the moment of inertia of the unequal I-section about its centroidal axes as shown in Figure	10	3:4:2.1.3

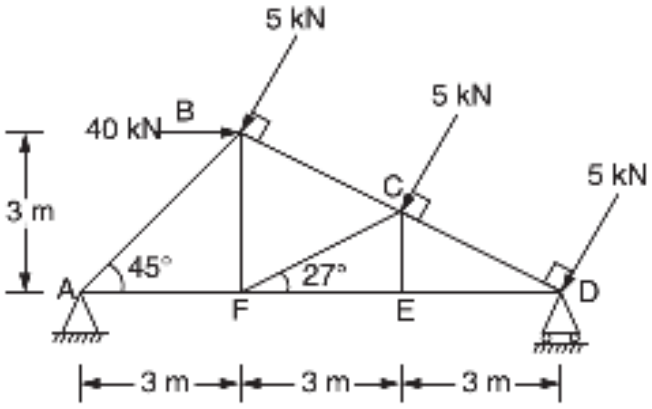


MODULE – 5

9.	a.	Analyse the truss shown in Figure by the method of joints. Tabulate the result and indicate the nature of force in the truss.	10	3:5:2.1.3



	b.	Find the support reactions and forces in the members BC, CF, EF & CE of truss as shown in Figure	10	3:5:2.1.3



OR

10.	a.	A block weighing 1500 N rests on a plane inclined at 20° to the horizontal. If μ = 0.3, find the force required to push the block up the plane when the line of action of force makes an angle of 30° with the plane.	10	3:5:2.1.3

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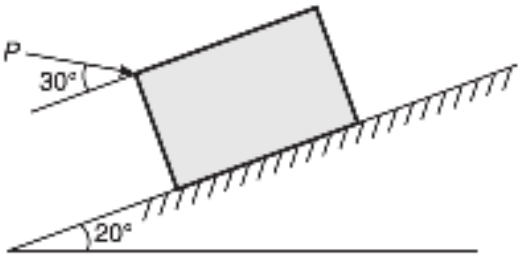
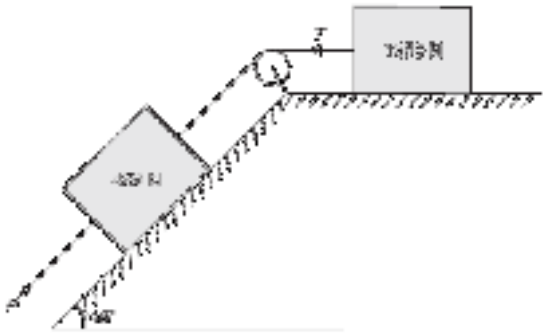


b. Determine the necessary force P acting parallel to the plane, as shown in Figure, in order to cause motion to impend. Take μ = 0.25. 10 3:5:2.1.3



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