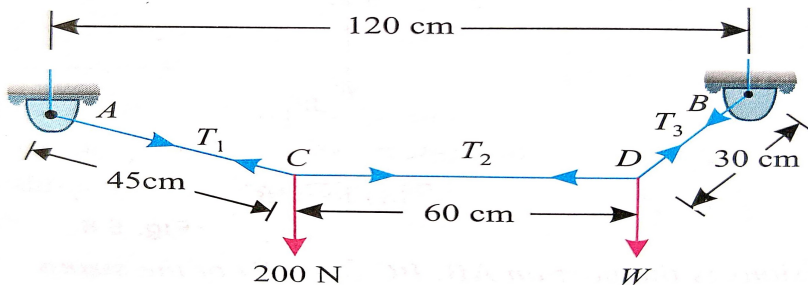


<b>Subject: Engg. Mechanics</b>	<b>Subject code: CE109</b>
<b>Group: B</b>	<b>Maximum marks: 60</b>
<b>Note: Attempt all question</b>	<b>Semester: I</b>
<b>Max. Time- 180 min.</b>	
<b>Subject Coordinator – Dr. Sarvesh P.S. Rajput</b>	

Q.1	A) Show that the algebraic sum of the resolved part of a number of forces in a given direction, is equal to the resolved part of their resultant in the same direction?	02
	B) The resultant of two forces P and Q is R. If Q is Doubled, the new resultant is perpendicular to P. Prove that Q is equals to R?	03
	C) A horizontal line PQRS is 12 m long, where PQ=QR=RS=4m. Forces of 1000 N, 1500 N, 1000 N and 500 N act at P, Q, R and S respectively with downward direction. The lines of action of these forces make angles of $90^\circ$ , $60^\circ$ , $45^\circ$ and $30^\circ$ respectively with PS. Find the magnitude, direction and position of the resultant force.	05
Q.2	A) State and prove Lami's Theorem.	02
	B) A rope is connected between two points A and B 120 cm apart at the same level. A load of 200 N is suspended from a point C on the rope 45 cm from A, as shown in figure. Find the load, that should be suspended from the rope D 30 cm from B, which will keep the rope CD horizontal.	04
	C) ABCD is a square. Forces of 10, 8 and 4 units act at A in the directions AD, AC and AB respectively. Using the analytical method, determine <ul style="list-style-type: none"> <li>(i) Resultant forces in magnitude and direction ;</li> <li>(ii) Magnitude and sense of two forces along the direction AJ and AH, where J and H are the mid-points of CD and BC respectively, which together will balance the above resultant.</li> </ul>	04



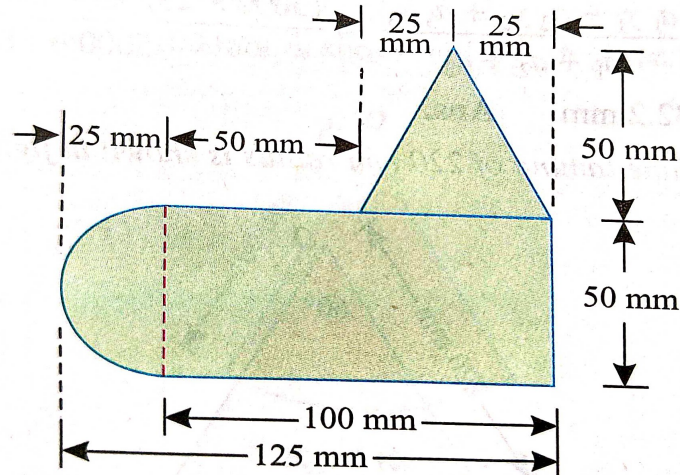
Q.3

A) Prove the parallel axis theorem in the determination of moment of inertia of areas with the help of neat sketch.

02

B) A uniform lamina shown in figure consists of rectangle, a circle and a triangle. Determine the centroid of the lamina. All dimensions are in mm.

04



C) Find the moment of inertia of a hollow rectangular section about its centroid, if the external dimensions are 40 mm deep and 30 mm wide and internal dimensions are 25 mm deep and 15 mm wide.

04

Q.4

A) What are various type of loadings? Distinguish clearly between uniformly distributed load and concentrated load.

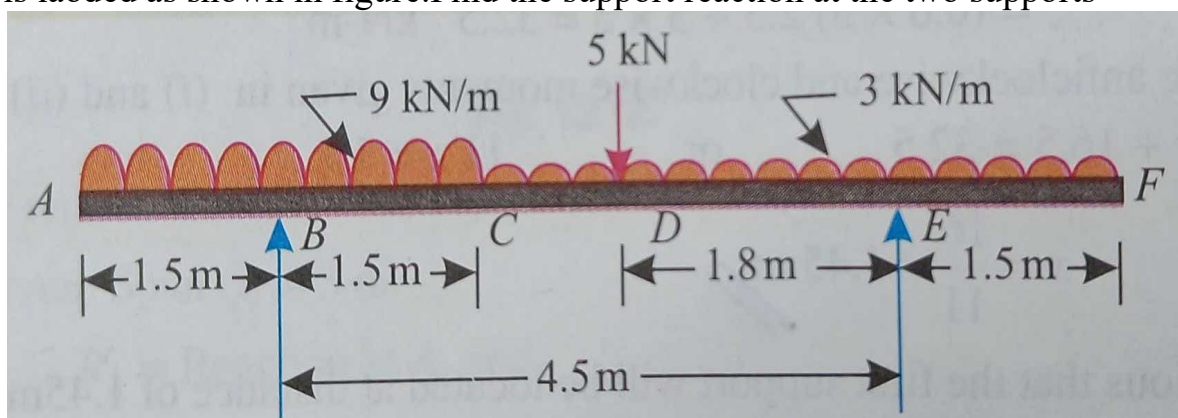
02

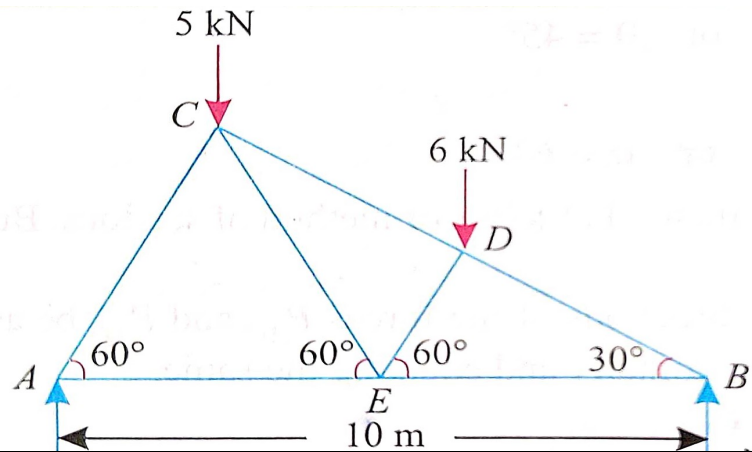
B) Define the term support reaction. Describe the analytical method for finding out the support reaction of a beam carrying vertical loads only

03

C) A beam ABCDEF of 7.5 m long and span 4.5 m is supported at B and E. The beam is loaded as shown in figure. Find the support reaction at the two supports

05



Q-5	<p>A) State Clearly the difference between a perfect frame and an imperfect frame?</p> <p>B) How would you distinguish between a deficient frame and a redundant frame?</p> <p>C) A Truss of span 10 meters is loaded as shown in figure .Find the forces in all members of the truss.</p>	<p>02</p> <p>02</p> <p>06</p>
		
Q-6	<p>A) What are the different types of beam ? Explain with the neat sketches.</p> <p>B) Define the term shear force and bending moment ?</p> <p>C) Draw the shear force and bending moment diagram for the given beam.Also locate the point of contraflexure,if any.</p>	<p>02</p> <p>02</p> <p>06</p>
	