



**P.E.S. College of Engineering, Mandya - 571 401**

(An Autonomous Institution affiliated to VTU, Belagavi)

**First Semester, B.E. - Semester End Examination; April - 2021**

**Engineering Mechanics**

(Common to all Branches)

Time: 3 hrs

Max. Marks: 100

**Course Outcomes**

The Students will be able to:

CO1: Apply the knowledge of basic science and mathematics to classify the force systems and compute its resultant.

CO2: Analyse the system of forces in equilibrium with or without frictional forces.

CO3: Locate the Centroid and composite moment of inertia of irregular and built up sections.

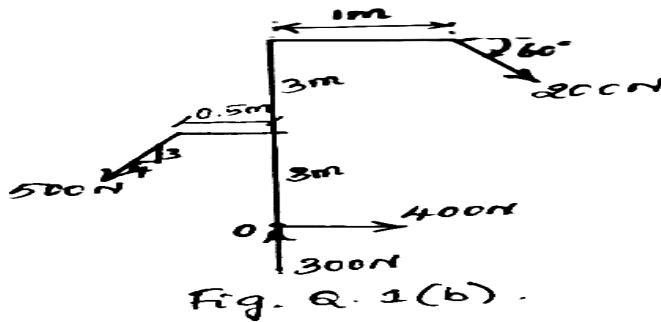
CO4: 4.Analyse the problems with respect to linear motion, curvilinear motion and energy.

**Note:** I) PART - A is compulsory. Two marks for each question.

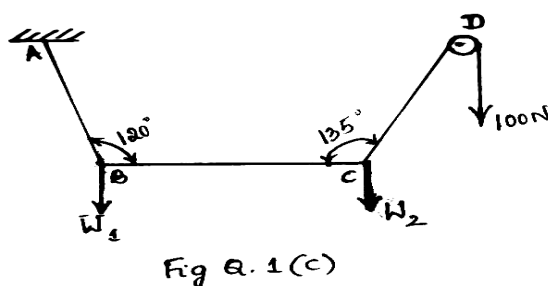
II) PART - B: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
<b>I : PART - A</b>		<b>10</b>			
I a.	Define principle of Transmissibility of force.	2	L1	CO1	PO1
b.	Briefly explain cone of friction.	2	L2	CO2	PO1
c.	Define Axis of Symmetry.	2	L2	CO3	PO1
d.	Define Radius of gyration.	2	L1	CO3	PO2
e.	Define Superelevation.	2	L1	CO4	PO1
<b>II : PART - B</b>		<b>90</b>			

<b>UNIT - I</b>		<b>18</b>			
1 a.	Briefly explain the basic idealization of the engineering mechanics.	9	L2	CO2	PO1
b.	Determine the magnitude, direction and position of the resultant force with respect to 'O' for the system of force shown in Fig. Q.1(b).				



c.	In the Fig Q. 1(c), the portion BC of the string is horizontal and pulley is frictionless. Determine tension in different parts of the string. Also find W1 and W2.	9	L3	CO1	PO2
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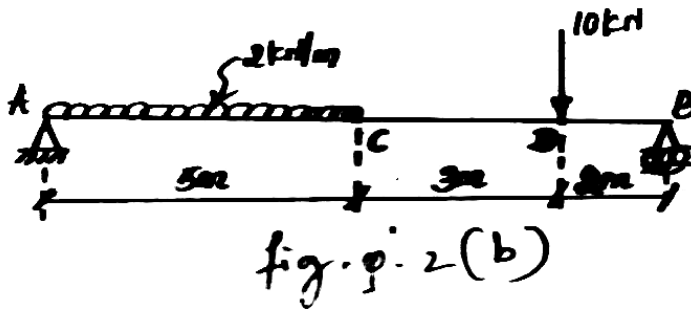


UNIT - II

18

- 2 a. With neat sketch, explain different types of loads and support.
- b. Determine the reactions for a beam as shown in Fig. Q2(b).

9 L2 CO2 PO2



9 L3 CO2 PO2

- c. A ladder 7 m long, weighing 300 N is resting against the wall at an angle  $30^\circ$  with the wall. A man weighing 700 N climbs the ladder, at what position does he induce slipping? Take  $\mu = 0.25$  for all contact surface.

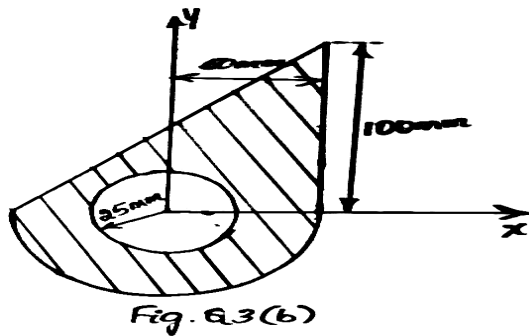
9 L3 CO2 PO2

UNIT - III

18

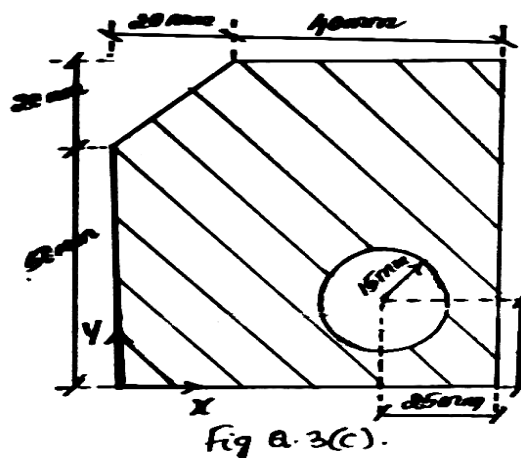
- 3 a. Derive the Centroid of a quadrant of a circle by the method of integration.
- b. Locate the Centroid of the plane shown in Fig. Q3(b)

9 L3 CO3 PO1



9 L3 CO3 PO2

- c. Locate the Centroid of the shaded portion shown in Fig. Q3(c)

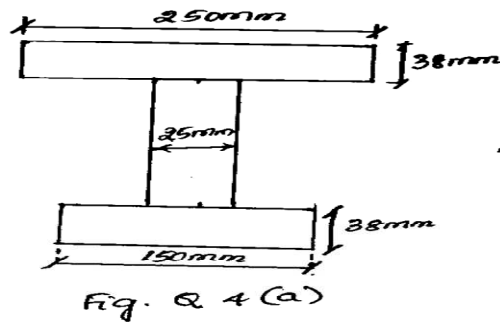


9 L3 CO3 PO2

UNIT - IV

18

4 a. Determine polar moment of Inertia for a I-section shown in Fig. Q4(a).

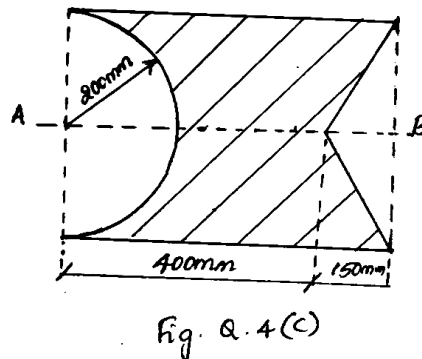


9 L3 CO3 PO2

b. State and prove Parallel axis theorem.

9 L2 CO3 PO3

c. Determine radius of gyration of shaded area shown in Fig. Q4(c) about the axis AB.



9 L3 CO3 PO3

UNIT - V

18

5 a. A stone is dropped into well and the splash of sound is heard after 4 sec. Find the depth of well by assuming the velocity of sound as 335 m/s.

9 L3 CO4 PO2

b. An aircraft moving horizontally at 120 kmph speed at an elevation of 1200 m targets a point on the ground and releases a bomb which hits it. Determine the horizontal distance of the aircraft (position when it releases the bomb) from the target. Also calculate the velocity and direction with which bomb hits the target.

9 L3 CO4 PO2

c. A cricket ball is thrown from a height of 1.8 m above the ground level at angle  $30^\circ$  with the horizontal with a velocity 12 m/s and is caught by the fielder at a height of 0.6 m above the ground. Determine the distance between the two players.

9 L3 CO4 PO2

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