



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

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester, B.E. Semester End Examination; Dec. – 2019

Engineering Mechanics
(Common to All Branches)

Time: 3 hrs

Max. Marks: 100

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
I : PART - A		10
I a.	Define force and list its characteristics.	2
b.	Distinguish between statistically determinate beam and statistically indeterminate beams.	2
c.	Define; i) Centroid of a plane figure and ii) Centre of gravity.	2
d.	State parallel Axis theorem.	2
e.	Define Acceleration and Retardation	2

II : PART - B	90
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UNIT - I

18

- 1 a. State and prove Varignon’s theorem of moments. 9
- b. The resultant of two forces, one of which is double the other is 260 N. If the direction of larger force is reversed and the other one remains unaltered, the resultant reduces to 180 N. Determine the magnitude of the force and angle between the two forces. 9
- c. A bracket is subjected to three forces and couple as shown in Fig. 1(c). Determine the magnitude, direction and line of action of resultant. 9

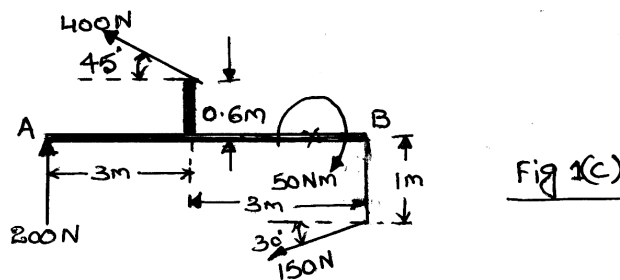


Fig 1(c)

UNIT - II

18

- 2 a. With neat sketches, explain angle of repose, Angle of friction and cone of friction. 9
- b. Find the reactions developed at support A and B of the loaded beam shown in Fig. 2(b). 9

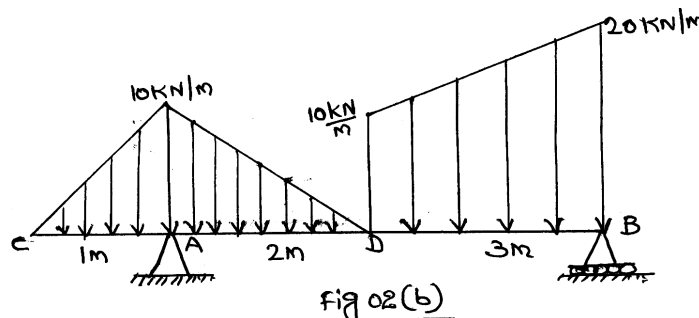
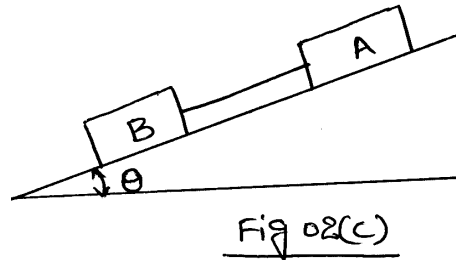


Fig 02(b)

- c. Block A weighing 1000 N and block B weighing 500 N are connected by flexible wire. The coefficient of friction between block A and plane is 0.5 while that for block B and the plane is 0.2. Determine what value of Inclination of the plane the system will have impending motion down the plane Ref. Fig. No. 2(c)

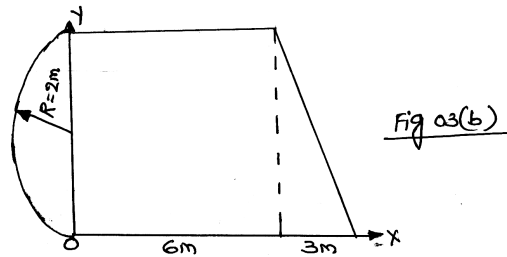


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UNIT - III

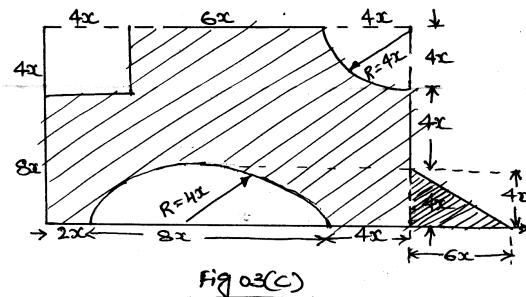
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- 3 a. Locate the centroid of semi circle by the method of integration.
 b. Determine the centroid of the area shown in Fig. 3(b) with respect to the axis shown.



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- c. Determine the coordinates of the centroid of the plane area shown in Fig. 3(c) with reference to axis shown, take $x = 40$ mm.

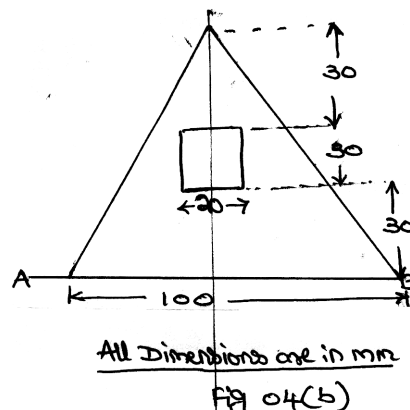


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UNIT - IV

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- 4 a. Derive an expression for second moment of area of triangle about base.
 b. Determine MI and radii of gyration of area shown in Fig. 4(b) about base A-B and the centroidal axis parallel to AB.



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c. Determine centroidal Polar moment of Inertia of a plane area shown in Fig. 4 (c).

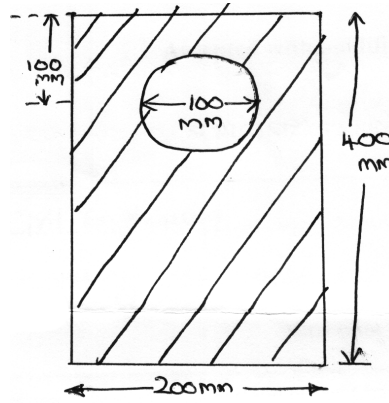


Fig 04(c)

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UNIT - V

18

5 a. With a neat sketch, explain the terms used in projectile motion.

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b. Find at what speed a vehicle can move round the curve of 40 m radius without side slip;

i) on level road

ii) on a road banked to an inclination of 1 in 10

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At what speed can the vehicle on blanked road without any lateral frictional force? Assume coefficient of friction between vehicle and road as 0.4.

c. A pilot flying his bomber at a height of 2000 m with a uniform horizontal velocity of 600 kmph wants to strike a target shown in Fig. 5(c). At what distance from the target, he should release the bomb?

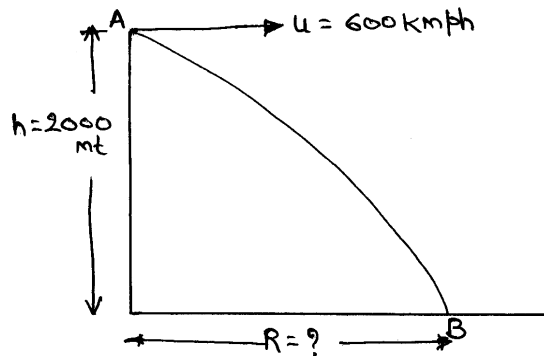


Fig 05(c)

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