c) Determine the second moment of area about horizontal centroidal axis for shaded area shown in Fig. Q7(C). Also find the radius of gyration about the same axis. Take R_1=50mm and R_2=20mm. 10

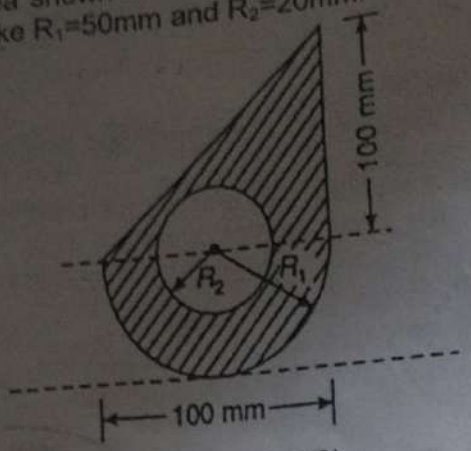


Fig. Q7(C)

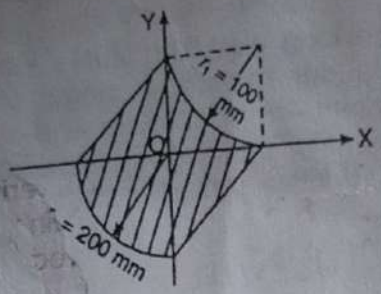


Fig. Q8(C)

8. a) Derive an expression for moment of ectangular lamina about its centroidal axis from first principles. 04
   b) State and Prove Parallel axis theorem 06
   c) Find the C.G of the shaded area, Fig. Q8(with respect to given X and Y axis. 10

Unit – V

9. a) State and prove work-energy principle. 06
   b) A body weighing 300N is pushed up by a 30^0 plane by a 400N force acting parallel to the plane as shown in the Fig. 9(b). If the initial velocity of the body is 1.5m/s and co-efficient of kinetic friction is μ=0.2, what velocity will the body have after moving 6m? 08

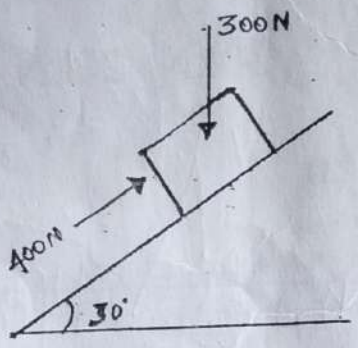


Fig. 9(b)

   c) Explain coefficient of restitution. What is the significance of coefficient of restitution? Define direct central impact. 06

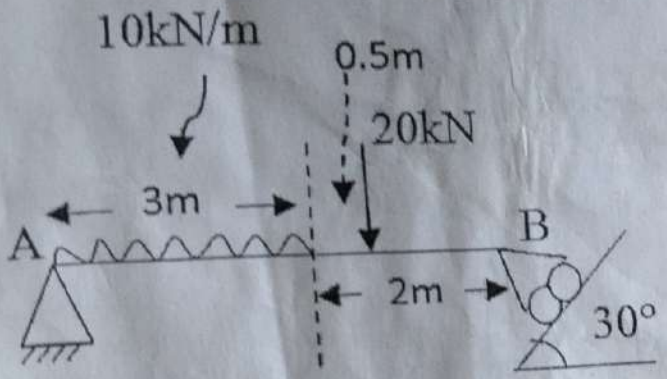
10. a) Explain 'D' Alembert's principle. 04
    b) A motorist travelling at a speed of 70 kmph suddenly applies brake and halts after skidding 50m. Determine
       (i) The time required to stop the car.
       (ii) The co-efficient of friction between the tyres and the road. 08
    c) Two identical balls impinge each other with velocities of 2m/s and 5m/s. If the coefficient of restitution is 0.8, determine the velocities of each ball after impact. Also find the loss of kinetic energy during impact. 08

BT* Bloom's Taxonomy, L* Level

****

Unit – III

5	a)	State Coulomb's laws of friction.	06	L2
	b)	Explain i) Cone of friction ii) Angle of friction.	06	L2
	c)	Determine the reactions at the supports A and B for the beam shown in the Fig.5 (c).	08	L4
6	a)	Explain different types of supports with their reactions.	06	L2
	b)	Determine the distance x in the figure 6(b) such that the reactions Ray and Rby are equal.	06	L4
	c)	A ladder 6m long weighing 20N placed against a vertical wall and a horizontal floor. The ladder makes an angle of 60° with the floor. A man weighing 60N reaches a point 4m from lower end of the ladder. The ladder is just about to slip. The coefficient of friction between the ladder and the wall is 0.2. Determine the coefficient of friction between ladder and the floor.	08	L4



Fig,5(C)

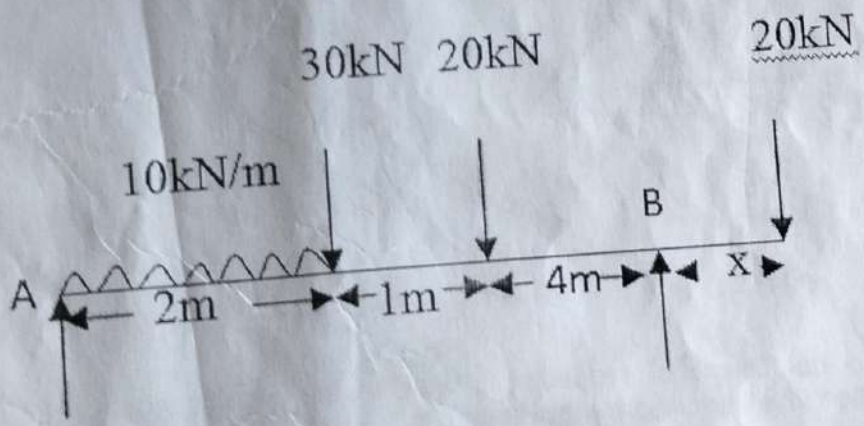


Fig.6(b)

Unit – IV

7	a)	Distinguish between Centroid and Center of Gravity.	04	L2
	b)	Determine the centroid of semicircle by the method of integration.	06	L4

3. a) Explain equivalent force couple system. 04
b) Distinguish between i) Resultant and Equilibrant ii) Moment and Couple 04
c) State conditions of equilibrium of a system of concurrent and non concurrent forces. 04
d) A system of connected flexible cables shown in the figure 3(d) is supporting two vertical loads 20 N and 25 N at B and C. Find θ, the inclination of the segment CD with vertical. Also find the forces developed in different parts of the cable. 08

4 a) State and prove Varignon's theorem. 05
b) Define couple. What are its characteristics? 05
c) Determine the magnitude and direction of the resultant of a system of non-concurrent system of forces acting on the lamina as shown in the fig. 4(c) and locate it with respect to point A. 10

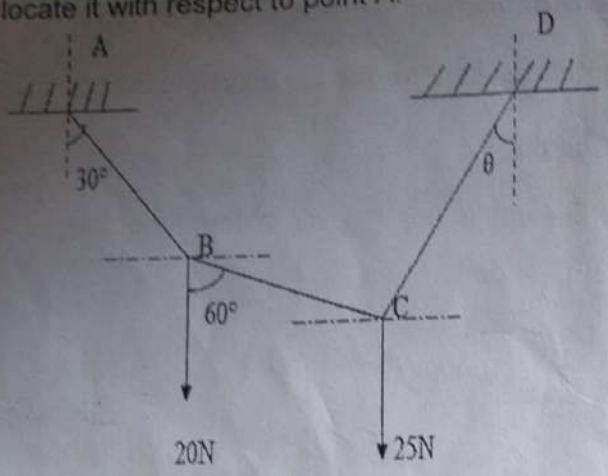


Fig.3(d)

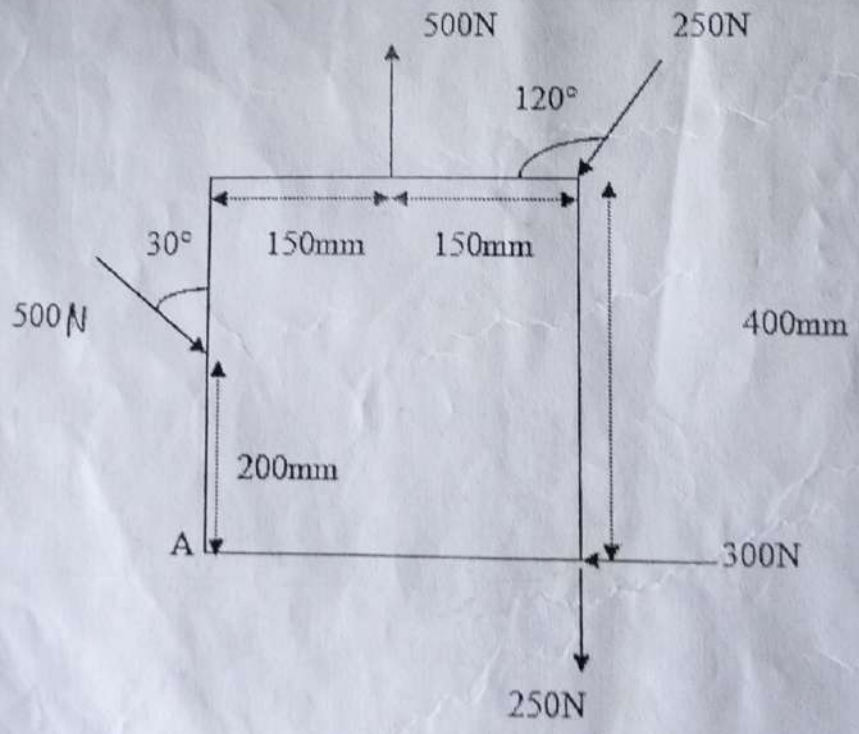


Fig.4(c)

USN | | | | | | | | | | |

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester B.E. (Credit System) Degree Examinations

Make up Examinations - January 2017

16CV103 – ELEMENTS OF CIVIL ENGINEERING AND ENGINEERING MECHANICS

Duration: 3 Hours | Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

			Marks	BT*
		Unit – I		
1.	a)	Explain the importance of the following fields of Civil Engineering and their part in the economic development of a nation, i) Geotechnical Engineering, ii) Water Resources Engineering.	06	L*2
	b)	State and explain principle of transmissibility of force with a neat sketch. State its limitations.	06	L2
	c)	Determine the magnitude and direction of the resultant for the force system acting at a point O as shown in Fig. Q 1 (c)	08	L5
2.	a)	Explain any three force system with neat sketch	06	L2
	b)	List and explain axioms of mechanics.	04	L2
	c)	Resultant of the four force system as shown in the Fig. Q 2 (c). Find the magnitude and direction of fourth force.	10	L5

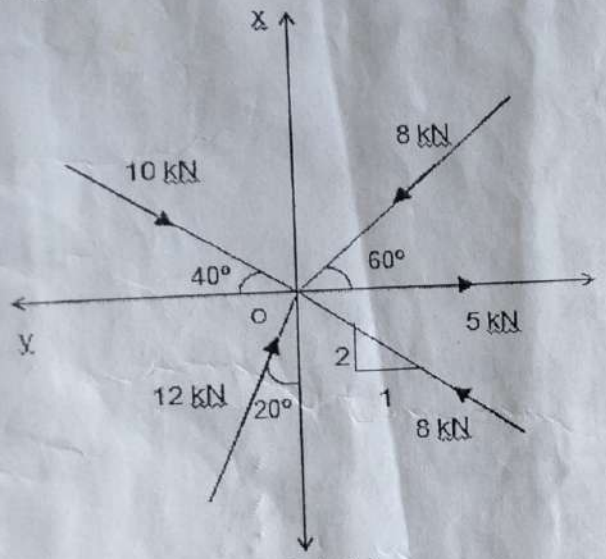


Fig. Q 1 (c)

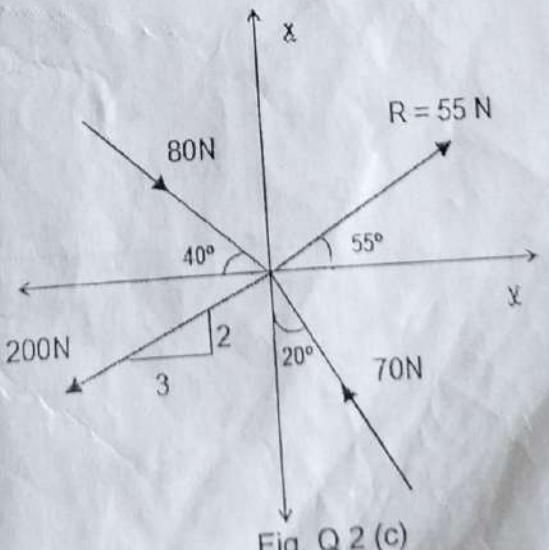


Fig. Q 2 (c)

SEE – April – May 2017

Unit – IV

7. a) State and prove parallel axis theorem. 6 L1
   b) Derive an expression for the moment of Inertia of semicircular section about the centroidal axes. 6 L4
   c) Determine the centroid of the section as shown in Fig. Q7(c). 8 L5

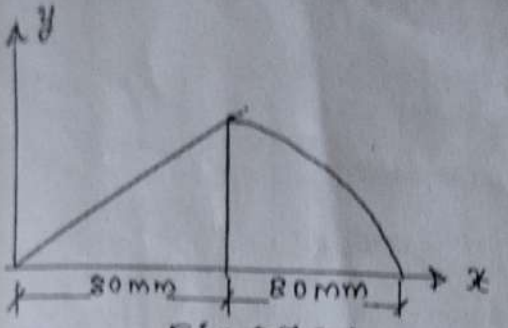


Fig Q7(c)

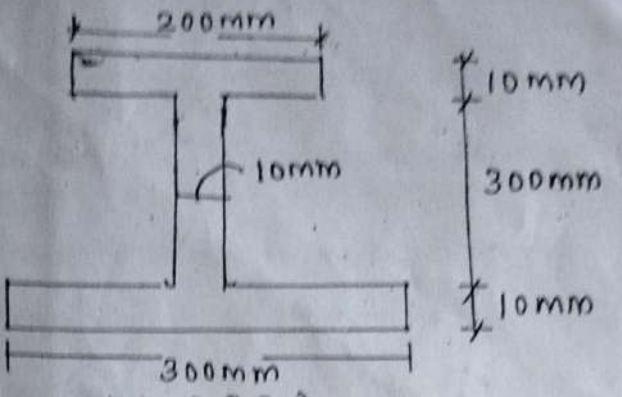


Fig Q.8(c).

8. a) Distinguish between centroid and center of gravity. 4 L1
   b) Determine the centroid of a triangle of base 'b' and height 'h' from first principle. 6 L5
   c) Determine the moment of Inertia of Fig. Q8(c) shown about centroidal X-axis and centroidal Y-axis. 10 L5

Unit – V

9. a) Define i) Work ii) Power iii) Energy 6 L1
   b) Explain i) Direct central impact ii) Coefficient of restitution iii) Impulse 6 L2
   c) A lift has an upward acceleration of 2m/sec^2. What pressure will a man weighing 800 N will exert on the floor of lift? 8 L6

10. a) State and explain D'Alemberts principle. 6 L1
    b) Derive an expression for work energy principle. 6 L4
    c) As shown in Fig. Q10(c), a 100N body moves along two inclines for which the coefficient of friction is 0.3. If the body starts from rest at A and slides 200m down the 30° incline, how far will it move along the other incline?

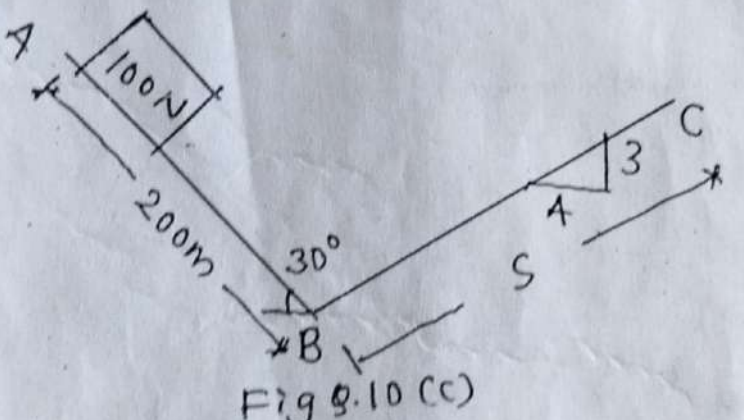


Fig Q.10 (c) 8 L5

BT* Bloom's Taxonomy, L* Level

****

c) Find the reaction from the inclined plane and tension in the string for the arrangement in Fig. Q 4(c). Take weight of ball = 450N.

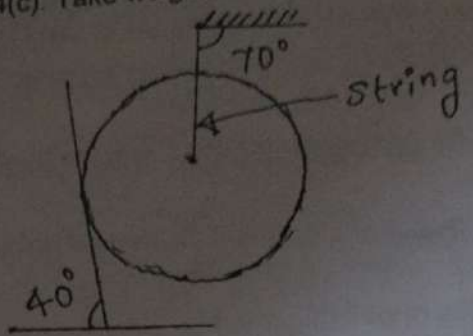


Fig Q.4 (c)

10 L1

Unit – III

5. a) Define i) Angle of friction ii) Angle of repose iii) Coefficient of friction 6 L2

b) Calculate the support reaction at A for the beam shown in Fig. Q5(b). The beam is hinged at point A and supported by cable CD self weight of the beam is 2 kN/m as indicated.

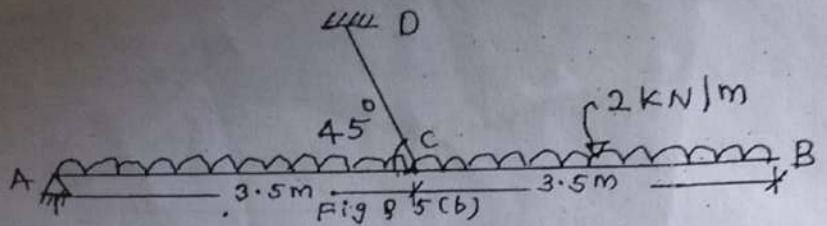


Fig Q 5(b)

8 L3

c) A simply supported beam of length 5m is loaded as shown in Fig.Q5(c). Find reactions at A & B.

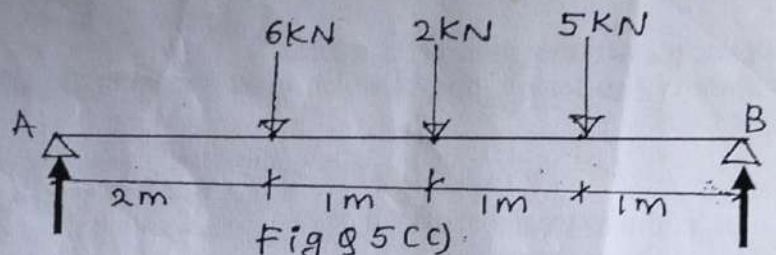


Fig Q 5 (c)

6 L1

6. a) Explain with sketches any three types of supports. 6 L1

b) Prove that angle of friction is equal to angle of repose. 6 L5

c) A ladder 6m long weighing 300 N is resting against a wall at an angle of 60° to the horizontal ground as shown in Fig. Q6(c). A man weighing 750N is climbing the ladder. At what position along the ladder from bottom does he induce slipping? Take coefficient of friction μ=0.2 for all surfaces.

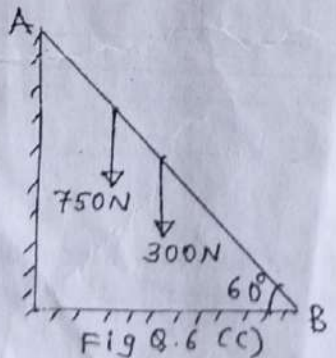


Fig Q.6 (c)

8 L

USN

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester B.E. (Credit System) Degree Examinations

April – May 2017

16CV103 – ELEMENTS OF CIVIL ENGINEERING AND ENGINEERING MECHANICS

Duration: 3 Hours

Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

			Marks	BT*
		Unit – I		
1.	a)	Briefly explain any two fields of civil Engineering.	6	L*2
	b)	Explain the basic idealizations in Mechanics.	4	L2
	c)	Four coplanar forces are acting at a point are shown in Fig. Q1(c). One of the forces is unknown and its magnitude is P. The resultant has a magnitude of 500 N and is acting along X-axis. Determine the unknown force P and its inclination with X-axis.	10	L5

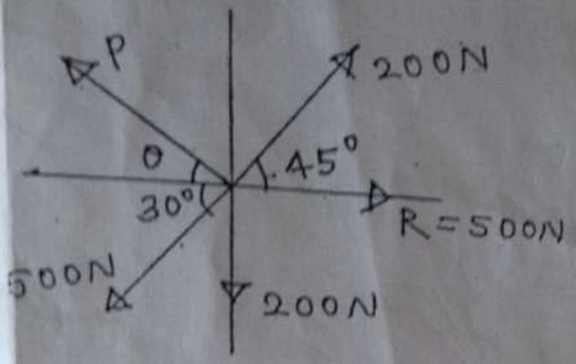


Fig. Q1 (c)

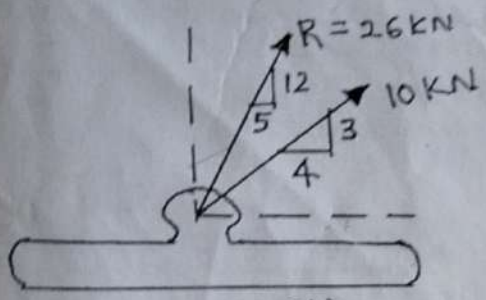


Fig. Q2 (b)

2.	a)	Briefly explain the concept of Resolution and composition of forces with sketches.	6	L2
	b)	State and explain principle of transmissibility of a force.	4	L2
	c)	26 kN is the resultant of two forces, one of which is as shown in Fig.Q2 (b). Determine the other force.	10	L5
		Unit – II		
3.	a)	Define couple. What are the characteristics of a couple?	5	L1
	b)	State and prove Varignon's theorem.	5	L1
	c)	System of forces are acting on a rigid bar as shown in Fig. Q 3 (c). Reduce this system to i) A single force ii) A single force and couple at A iii) A single force and couple at B	10	L4

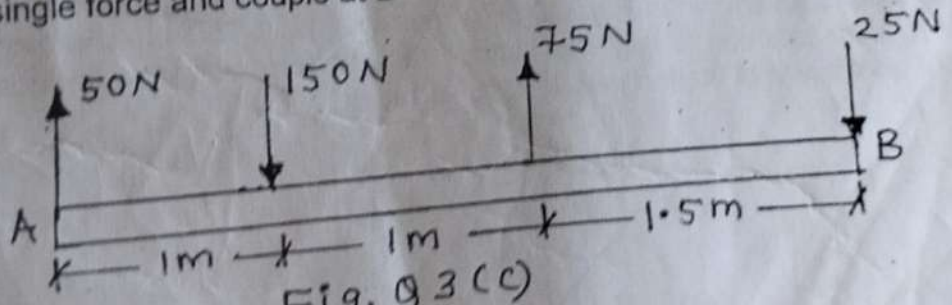


Fig. Q3 (c)

4.	a)	How do you differentiate between Equilibrium and Equilibrant?	4	L2
	b)	Write the equations of equilibrium for different force system.	6	L5

16CV103

10. a) State and explain D'Alembert's principle.
b) Define direct central impact and coefficient of restitution.
c) A small block of mass m is placed at A on an inclined plane as shown in Fig. Q10(c). If the coefficient of kinetic friction between the block and the plane is 0.3 and the block slips, find
i) the acceleration of the block
ii) the velocity of the block when it reaches the bottom of the plane.
iii) the time interval in which the block will reach the bottom plane

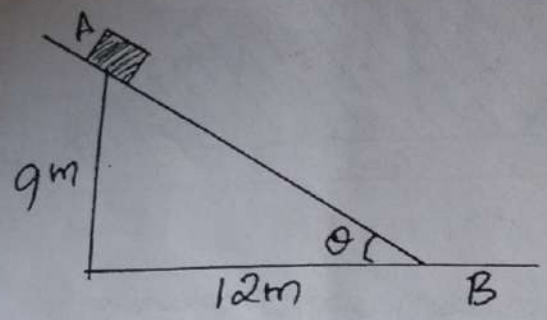


Fig. Q10(c)

BT Bloom's Taxonomy, L* Level*

****

Unit – IV

a) Derive an equation for moment of inertia of semi circular area about diametral axis. 6

b) State and prove parallel axis theorem. 4

c) Determine the moment of inertia of the shaded area shown in Fig. Q7(c) about the horizontal centroidal axis. All dimensions are in m.

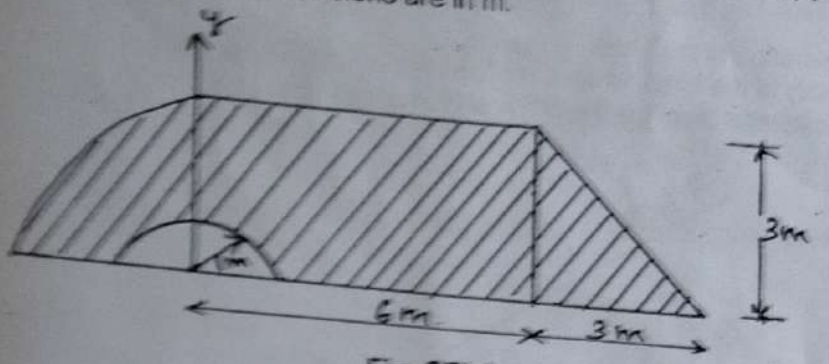


Fig. Q7(c)

10

a) Derive the moment of Inertia of a triangle about its base. 6

b) State and prove perpendicular axis theorem. 4

c) Determine the centroid of the shaded area shown in Fig. Q8(c)

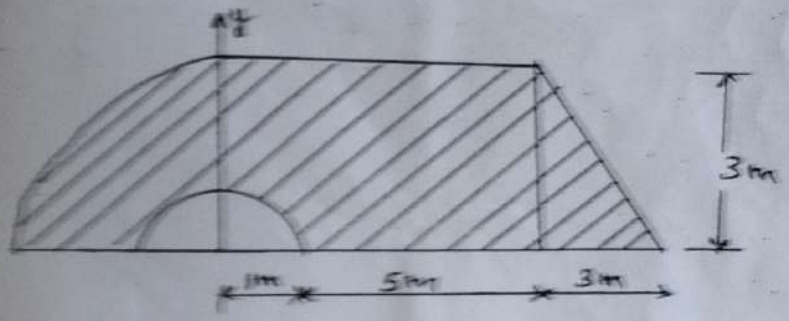


Fig. Q8(c)

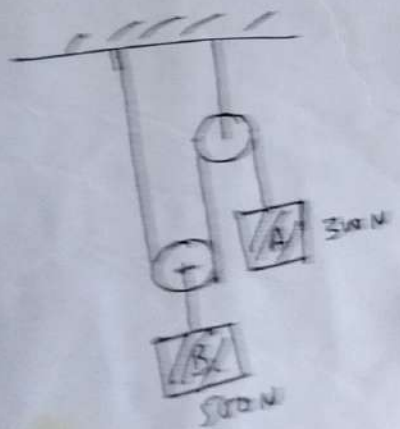
10

Unit – V

a) State and prove work-energy principle. 6

b) State and explain impulse-momentum principle. 4

c) Determine the acceleration of the blocks and tension in the strings for the system of blocks connected as shown in Fig.Q 9(c). Assume the Pulleys to be frictionless.



10

16CV103

4. a) State and prove Varignon's theorem. 6
   b) Explain couple and its characteristics. 4
   c) Determine the resultant of the force system as shown in Fig. Q4(c) with respect to O.

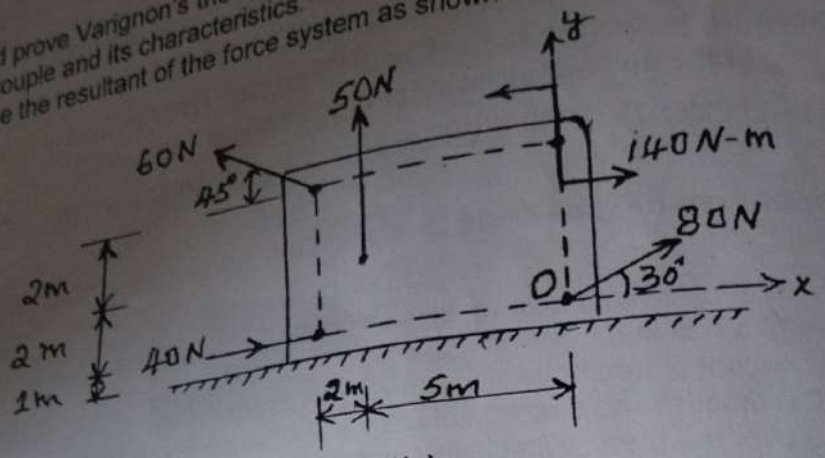


Fig. Q4(c)

10

Unit – III

5 a) Explain different supports with neat sketches. 6
   b) State Coulomb's laws of dry friction (any Four). 4
   c) Calculate the support reactions at location A shown in Fig. Q5(c).

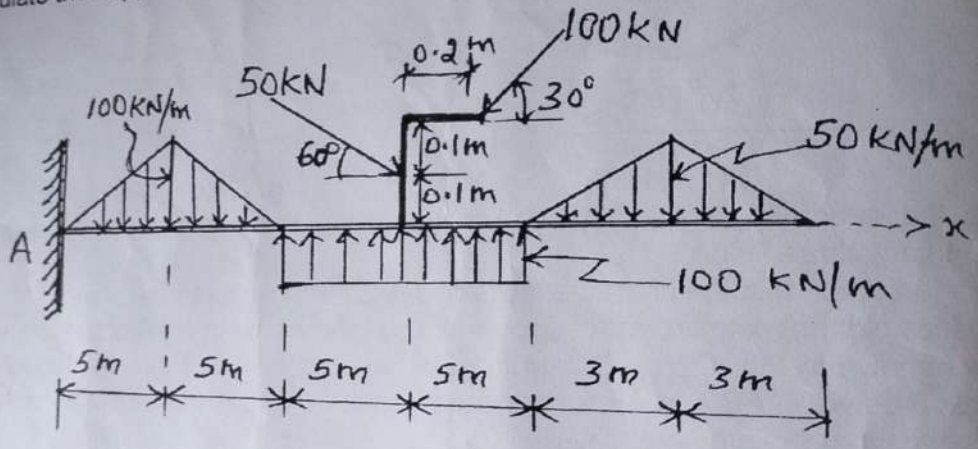


Fig. Q5(c)

6. a) Define i) Limiting friction ii) Angle of friction
   b) Explain plain different types of beams with neat sketches.
   c) What is the value of P in the system shown in Fig. Q6(c) to cause the motion to impend? Assume the pulley is smooth, coefficient friction between other contact surface is 0.2.

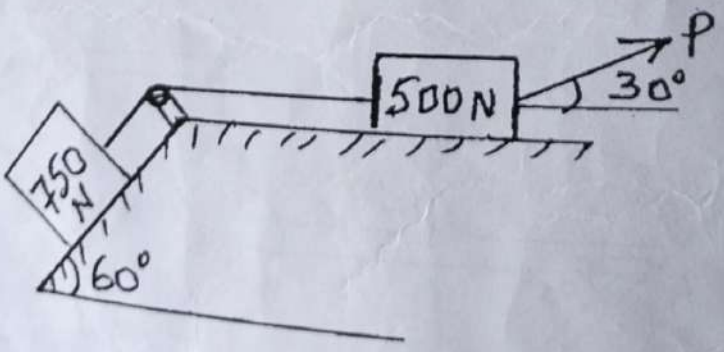


Fig. Q6(c)

USN | | | | | | | | | | |

NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

First / Second Semester B.E. (Credit System) Degree Examinations

Make up / Supplementary Examinations - July 2017

16CV103 – ELEMENTS OF CIVIL ENGINEERING AND ENGINEERING MECHANICS

Duration: 3 Hours

Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

Unit – I

			Marks
1.	a)	Explain the role of structural and environmental fields of civil engineering in the development of a nation.	6
	b)	Explain the concept of free body diagram with an example.	4
	c)	Determine the amount and direction of the smallest force P required to start the wheel in Fig. Q1(c) over the block. What is the reaction at the block?	10

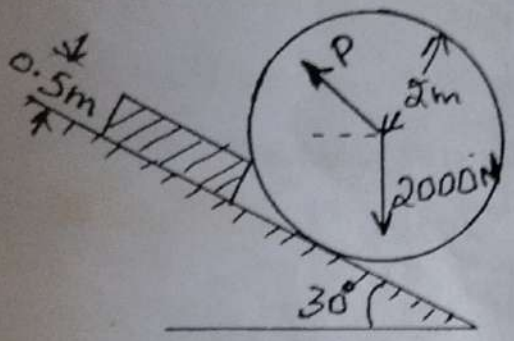


Fig. Q1(c)

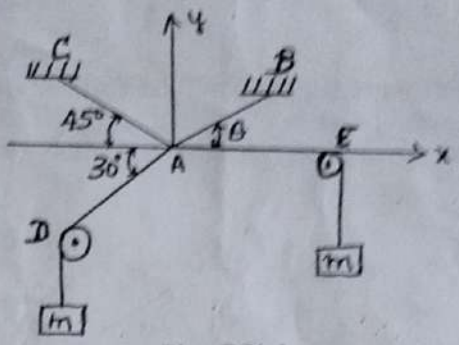


Fig. Q2(c)

2.	a)	Explain the needs of civil engineering in improving the economy of a nation with respect to any three fields.	6
	b)	Define a force. Explain the characteristics of a force with an example sketch.	4
	c)	Four pieces of string knotted at A support two equal masses in equilibrium in a vertical plane as shown in Fig. Q2(c). Determine the tensions in the strings AB and AC and the angle 0 between AB and AE for minimum tension in AB. (Note: Strings AE and AD are passing through smooth pulleys).	10

Unit – II

3.	a)	Explain equivalent force couple system with the help of a neat sketch.	4
	b)	Define equilibrant. List laws of equilibrium for concurrent and non-concurrent force system.	6
	c)	Draw the free-body diagram of member ABC which is supported by a smooth bar at A, roller at B and short link CD. Determine the normal reactions at A and B and the force in link CD acting on the member.	10

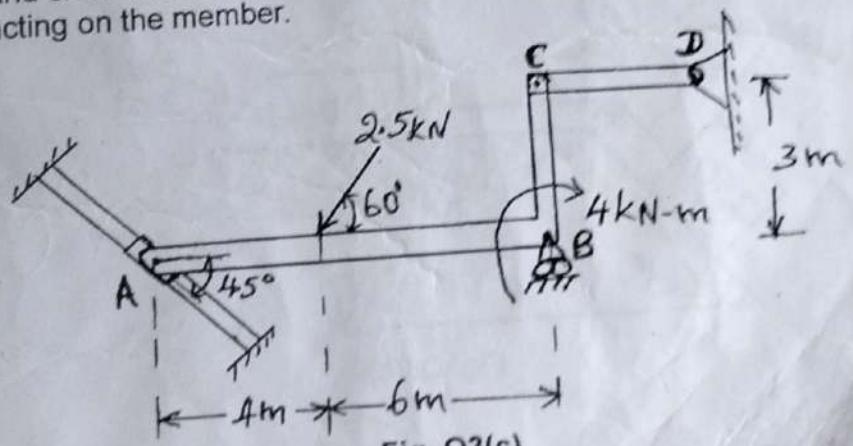


Fig. Q3(c)