18CV103

c) Determine the moment of inertia of shaded area shown in Fig.Q5(c) with respect to horizontal centroidal axis and also find radius of gyration.

10	L3	4	1, 2

Unit – III

7.
a) State and explain work energy principle.
b) Explain curvilinear motion and super elevation with neat sketch.
c) A ladder AB of length 5 m weighing 200 N and it supports a man weighing 500 N at the top of ladder. Coefficient of friction between ladder and wall is 0.3 and ladder and floor is 0.2. Determine the inclination of ladder with horizontal such that ladder does not slip.

6	L2	5	1
6	L2	5	1
8	L3	5	1,2

8.
a) Define angle of repose and show angle of repose equal to angle of friction.
b) State and explain impulse momentum principle.
c) Find the power of locomotive driving a train whose weight including that of engine is 420kN up an inclined 1 in 120 at steady speed of 50kmph. The frictional resistance being 5N/kN. While the train is ascending suddenly the steam is shut off, find how far will it move before coming to rest assuming frictional resistance remains the same.
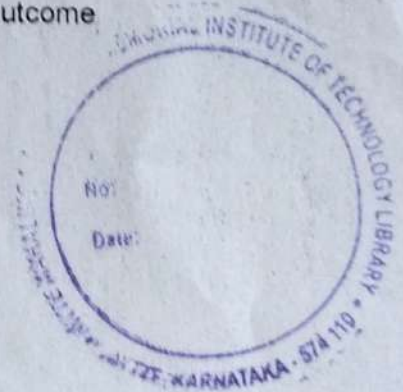
4	L1	5	1
6	L2	5	1
10	L3	5	1,2

BT* Bloom's Taxonomy, L* Level; CO* Course Outcome; PO* Program Outcome

****

-3-

18CV103

3. a) Explain the following scopes of Civil Engineering in the economic growth of a nation, i) Transportation Engineering, ii) Surveying   6 L2
   b) Explain any three force system with neat sketches.   6 L2
   c) Determine the inclination of string 'AB' with horizontal and tension in the strings for a system of strings in equilibrium shown in Fig. Q 3 (c).
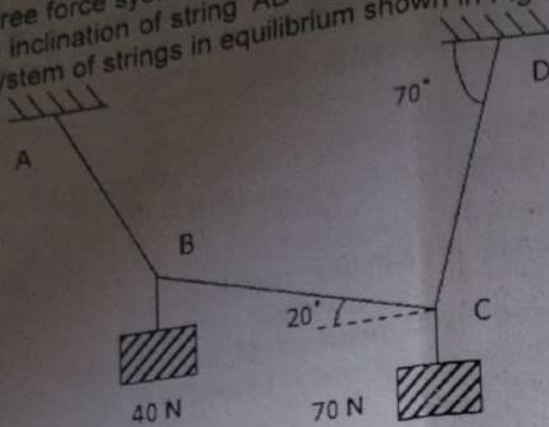

Fig. Q 3 (c)

7.

Unit – II

4. a) State and prove parallel axis theorem.   6 L2 3
   b) Develop an expression for centroid of a semicircular lamina from the method of integration.   6 L3
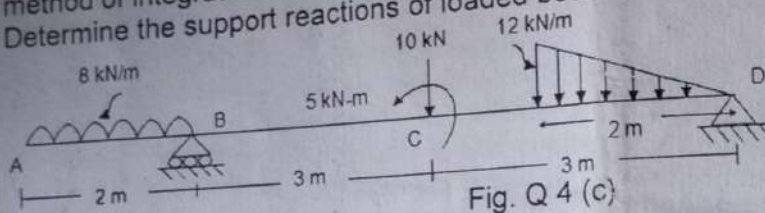   c) Determine the support reactions of loaded beam shown in Fig. Q 4 (c).

Fig. Q 4 (c)

8 L3

5. a) Develop an expression for moment of inertia of a triangle lamina about its base.   6 L3
   b) Explain any four types of beams with neat sketches.   6 L2
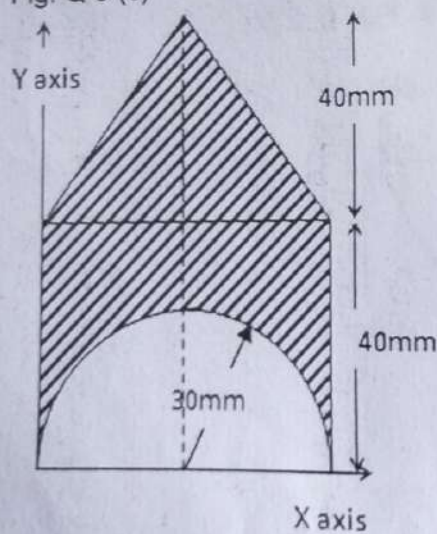   c) Locate the centroid of shaded area with respect to given axis shown in Fig. Q 5 (c)

Fig. Q 5 (c)

8 L3

6. a) Define the following i) polar moment of interia ii) radius of gyration.   4 L1
   b) Explain any Three types of Supports with neat sketches.   6 L2

-2-

USN

NMAM INSTITUTE OF TECHNOLOGY, NITTE
(An Autonomous Institution affiliated to VTU, Belagavi)
Second Semester B.E. (Credit System) Degree Examinations
April - May 2019
18CV103 – ENGINEERING MECHANICS

Duration: 3 Hours

Max Marks: 100

Note: Answer Five full questions choosing Two full questions from Unit – I and Unit – II each and One full question from Unit – III.

Unit – I

		Marks	BT*	CO*	PO*
3 a)	Explain the equivalent force couple system with neat sketches.	6	L*2	2	1
b)	State and prove Varignon's theorem.	6	L2	2	1
c)	Determine the magnitude and direction of resultant of force system acting at point 'O' shown in Fig. Q 1 (c).				

Fig. Q 1 (c)
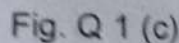
8	L3 1 1, 2

5 a)	Distinguish between i) resolution and composition ii) resultant and equilibrant.	4	L2	1	1
b)	State and explain principle of transmissibility of a force with a neat sketches and list its limitations.	6	L2	1	1
c)	Solve the coplanar non-concurrent force system shown in Fig. Q 2 (c) for resultant and represent with respect to point 'O'.				

Fig. Q 2 (c)
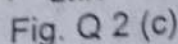
10	L3 2 1, 2

c) Find the support reactions of the beam loaded as shown in Fig 6(c).

Fig.6(C)

08 L3
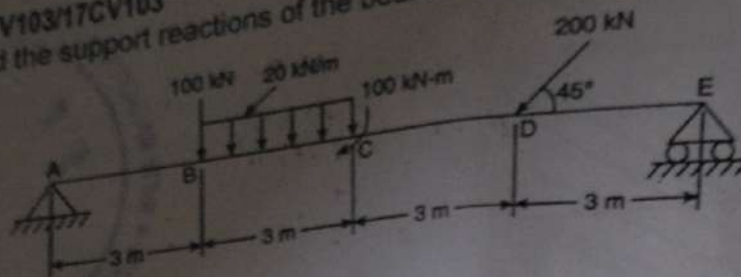
Unit – III

7. a) Define the following
   i).Angle of Repose ii).Angle of Friction iii).Cone of Friction
   iv).Co-efficient of Friction   08 L1

   b) State any Four laws of dry friction.   04 L1

   c) A 10000 kN train is accelerated at a constant rate up a 2% grade.
   The track resistance is constant at 10N/kN. The velocity increases
   from 9 m/s to 18m/s, in a distance of 1km. Determine maximum
   power developed by the locomotive. Use work Energy principle.   08 L3

8. a) Define Impulse and momentum. Derive impulse-momentum
   equation.   06 L1

   b) State and prove work energy principle.   06 L1

   c) A uniform ladder "AB" is 4m in length and weighs 200N.This is
   placed against a wall with "A" at floor and "B" on wall. Ladder
   makes an angle 60° with floor. The coefficient of friction b/w floor
   and ladder is 0.40 and b/w wall and ladder is 0.35. In addition to
   self weight of ladder it has to support a man weighing 950 N at
   point B. To prevent slipping a force "P" is applied horizontally at the
   level of floor. Find the minimum force for this condition.   08 L3

BT* Bloom's Taxonomy, L* Level;   CO* Course Outcome; PO* Program Outcome

****

L1

1   c) Locate the First moment of area of the section With respect to the to the axes as shown in Fig.4(c)

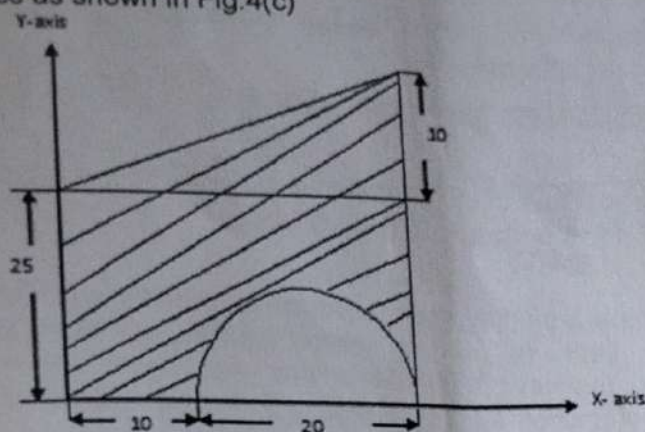
Fig.4(c)
Note: All Dimensions are in mm   08   L3   4   2

5. a) Define Centroid. Derive an expression for Centroid of a Semi-Circular area about its diametral axis by method of Integration.   06   L3   4   1

   b) i). List the practical application of Centroid and Moment of Inertia   06   L1   4   1
       ii). List the difference between Centroid and Centre of Gravity

L3   1   c) Determine the Moment of Inertia of the section shown in Fig.5C with respect to Centroidal Axes.

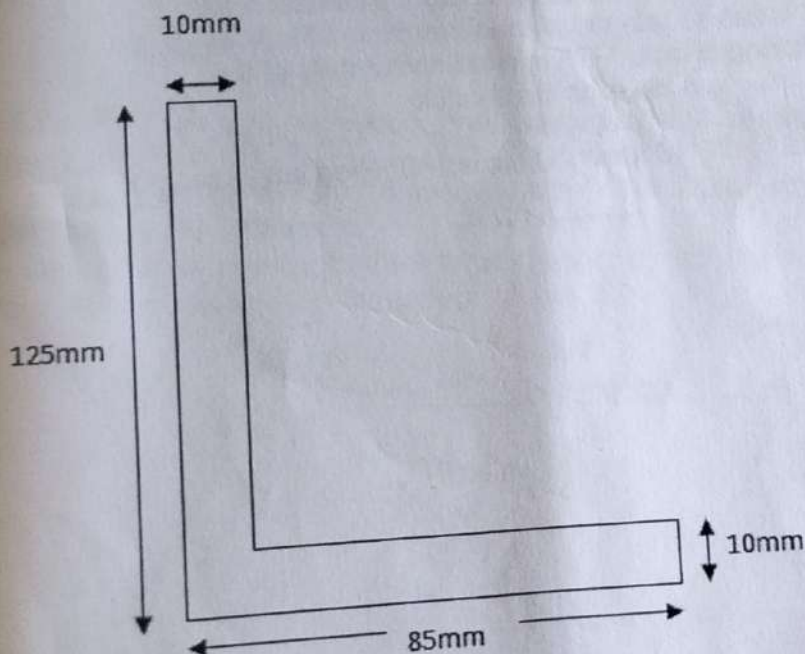

Fig.5(C)
Note: All Dimensions are in mm   08   L3   4   2

L3   1   a) Derive an expression for moment of inertia of triangular lamina about its Base.   06   L3   4   1

L2   3   b) Define i).Radius of Gyration   ii).Parallel Axis Theorem   06   L1   4   1
             iii).Perpendicular Axis Theorem

L1   3

-3-

18CV103/17CV103

3. a) Explain with examples the basic idealization in engineering mechanics. 06 L1

b) Determine the forces induced in the members AC and BC, and 500 N is the Horizontal Force acting in the structure at point "C" shown in Fig.3(b)
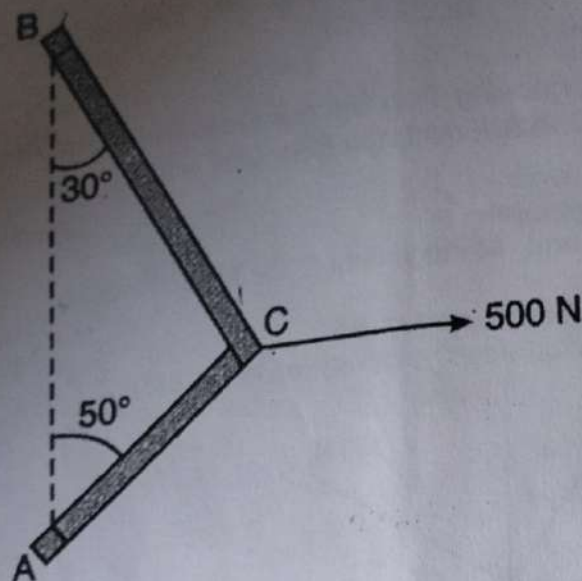
18CV

c) Loca to th

Fig.3(b)

a) De
Ci
b) i).
ii)
c) D
w

c) Determine the reaction at contact point for identical cylinder placed in trench as shown in Fig.3(c) whose weight is 200 N and radius is 100mm. 06 L3
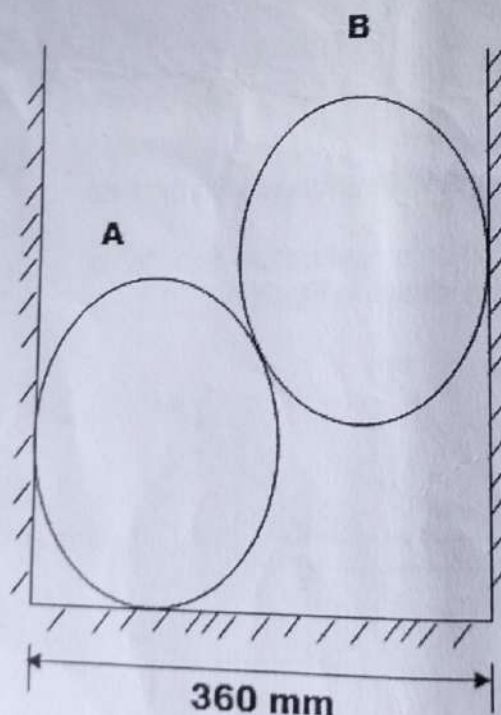

360 mm

Fig.3(c)

08 L3 a)

Unit – II

4. a) Explain the various types of loads acting on a beam. b)

b) With the help of a free body diagram explain any three types of supports. 06 L2

06 L1

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 2019

18CV103/17CV103 – ENGINEERING MECHANICS/ELEMENTS OF CIVIL ENGINEERING AND ENGINEERING MECHANICS

Duration: 3 Hours

Max. Marks: 100

Note: Answer **Five full** questions choosing **Two full** questions from **Unit – I** and **Unit – II** each and **One full** question from **Unit – III**.

Unit – I

			Marks	BT*	CO*	PO*
1.	a)	Explain the Scope of Civil Engineering in i).Construction Technology and Management ii).Geotechnical Engineering	06	L*2	1	1
	b)	Define Couple and List Characteristics of couple.	06	L1	1	1
	c)	Determine the resultant of the force system as shown in Fig 1.(c)				
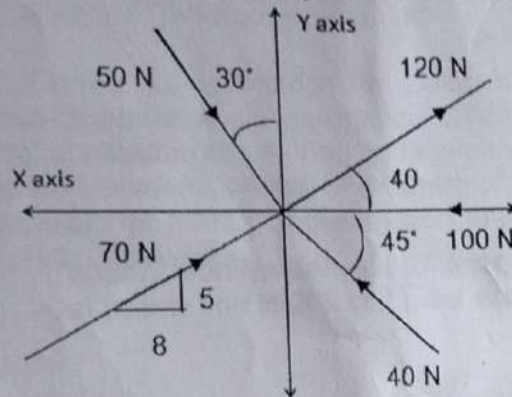
Fig 1.(c)

			08	L3	1	2

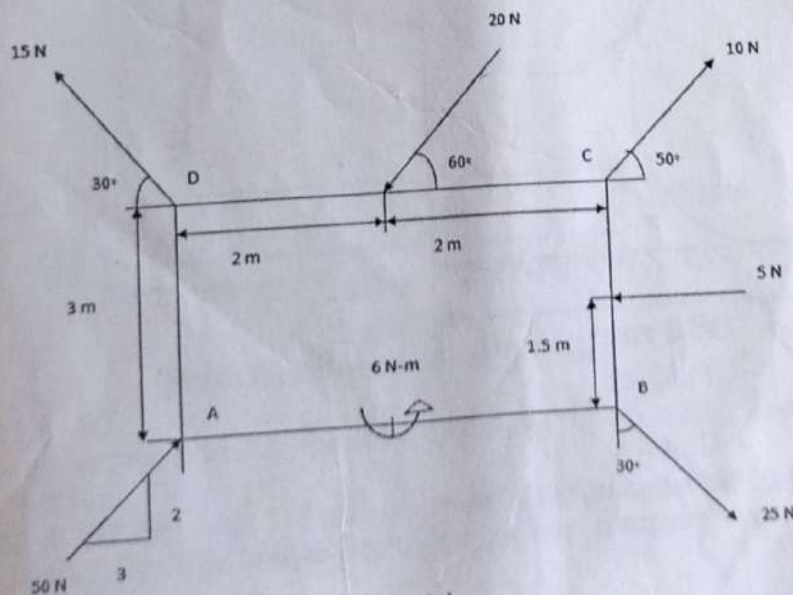| 2.	a)	State and Prove Principle of Moments.	06	L1	2	1
	b)	Distinguish between Force, Resultant, and Equilibrium with the help of a neat sketches.	06	L1	1	1
	c)	Find the magnitude, direction, and point of application from "A" of the resultant force for the force system shown in Fig.2(c).				

Fig.2(c)

			08	L3	2	2

c) In the system of blocks shown, if m_1=8kg and m_2=5kg, determine the velocities of the blocks after the block of mass m_2 displaces by 2m, Fig. 8c.
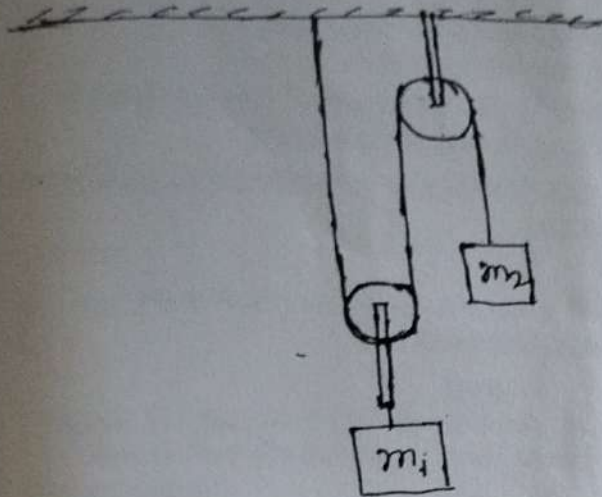

Fig 8C

10   L2   5   2

* Bloom's Taxonomy, L* Level;   CO* Course Outcome; PO* Program Outcome

****

19CV103

b) Find the reactions at the supports A and B of the beam shown in Fig. 4b.
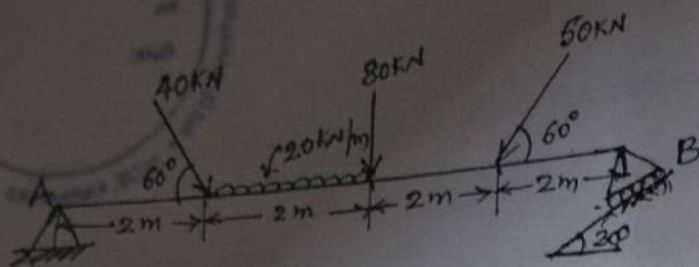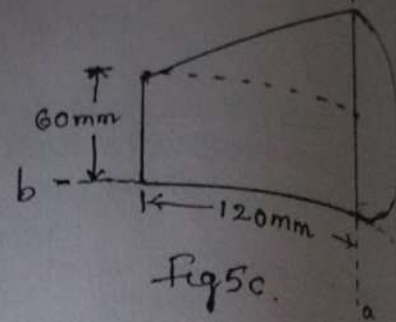
12

fig 4b.

fig 5c.

5. a) Derive an expression for centroid of a Quadrant lamina using method of integration about its radial axis. 6 L2
   b) Differentiate between centroid and centre of gravity. 4 L1
   c) Determine the centroid of area shown in Fig. 5c by taking moment of area about the given a-a axis and b-b axis. Locate the centroid. 10 L3

6. a) Derive an expression for centroid of a semicircular lamina using method of integration about its diametral axis. 6 L2
   b) State parallel axes and perpendicular axes theorems. 4 L1 Bloom
   c) Find the moment of inertia of the shaded area about the Horizontal centroidal axis Fig. 6c. 10 L2
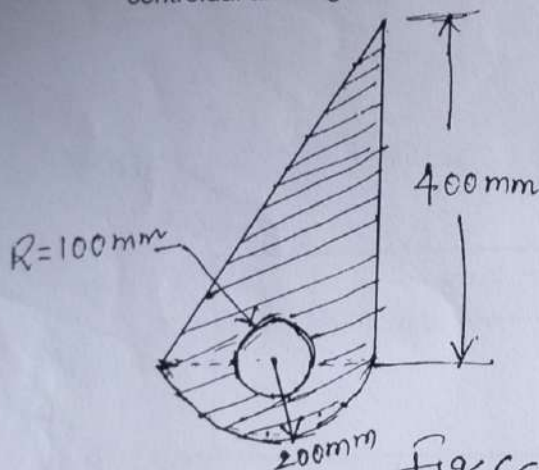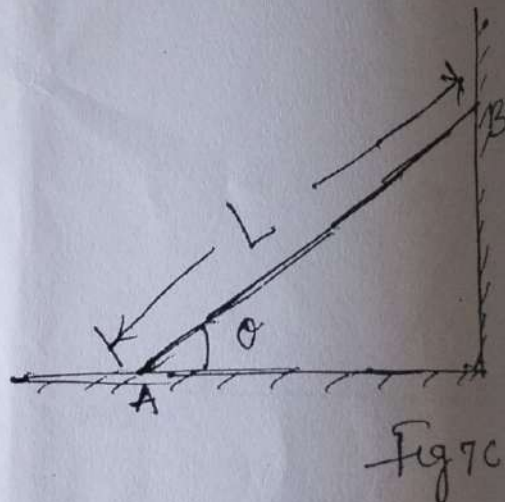

fig 6c

fig 7c

Unit – III

7. a) Define curvilinear motion with suitable examples. 4 L
   b) Explain impulse momentum principles and its applications. 6
   c) The uniform rod having a weight W and length L is supported at its ends A and B as shown in Fig.7c. The coefficient of static friction $\mu_s = 0.2$. Determine the greatest angle θ so that the rod does not slip. 10

8. a) Explain the difference between coefficient of friction and angle of friction. 4 L
   b) What do you mean by "angle of repose"? Prove that the angle of repose is equal to the angle of friction. 6 L

-2-

USN

NMAM INSTITUTE OF TECHNOLOGY, NITTE
(An Autonomous Institution affiliated to VTU, Belagavi)
First Semester B.E. (Credit System) Degree Examination
November - December 2019
19CV103 - ENGINEERING MECHANICS

ation: 3 Hours

Max. Marks: 100

Note: 1) Answer **Five full** questions choosing **Two full** questions from **Unit – I & Unit – II each** and **One full** question from **Unit – III.**
2) Assume missing data suitably.

	Unit – I	Marks	BT*	CO*	PO*
a)	Explain the scope and importance of Structural Engineering and Transportation Engineering	6	L*1	1	1
b)	Define couple. Mention its characteristics.	4	L1	2	1
c)	Four forces of magnitude 10kN, 15kN, 20kN and 40kN are acting at a point O. The angle made by 10kN, 15kN, 20kN and 40kN with positive X-axis are 30°, 60°, 90° and 120° respectively. Find the magnitude and direction of resultant force.	10	L2	1	2
a)	Define moment of a force. Mention types of moment.	4	L1	2	1
b)	Explain the basic idealizations of Engineering Mechanics.	6	L1	1	1
c)	A body weighing 2000 N is suspended with a chain AB 2m long. It is pulled by a horizontal force of 320N as shown in Fig. 2c. Find the force in the chain and the lateral displacement of the body.	10	L2	2	2

Fig 2c.
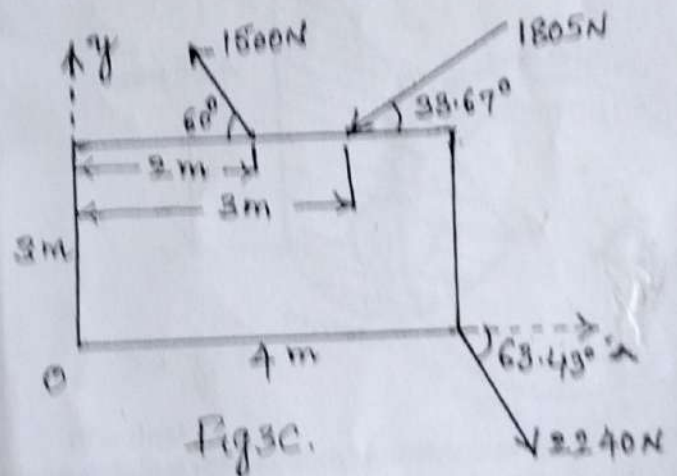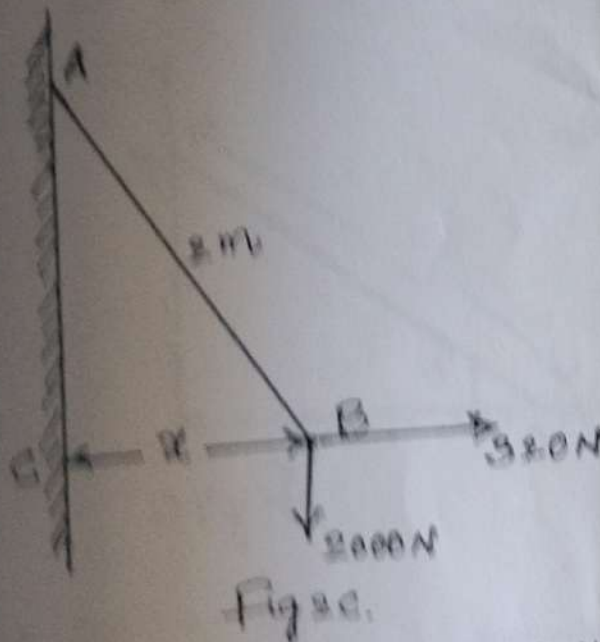
Fig 3c.

		Marks	BT*	CO*	PO*
a)	Mention conditions of equilibrium for Non concurrent force system.	3	L1	2	1
b)	Prove "Sum of moments of force system is equal to moment of the resultant from the same moment centre."	5	L2	2	1
c)	Fig. 3c shows the coplanar system of forces acting on a flat plate. Determine i) the resultant and ii) x and y intercepts of the resultant.	12	L2	2	2

Unit – II

		Marks	BT*	CO*	PO*
a)	Explain types of supports and types of loads.	8	L1	3	1

-1-