Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 10 – 12- 2025 **Time:** 09:30am – 12:30pm

School: SOE	**Program:** B. Tech. (Civil Engineering)	
Course Code: CIV1501	**Course Name:** Elements of Engineering Mechanics	
Semester: I	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
Marks	**10**	**20**	**12**	**17**	**19**	**22**

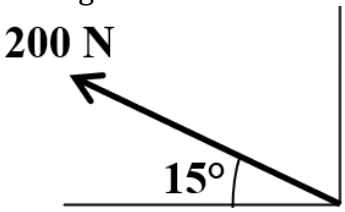
Instructions:

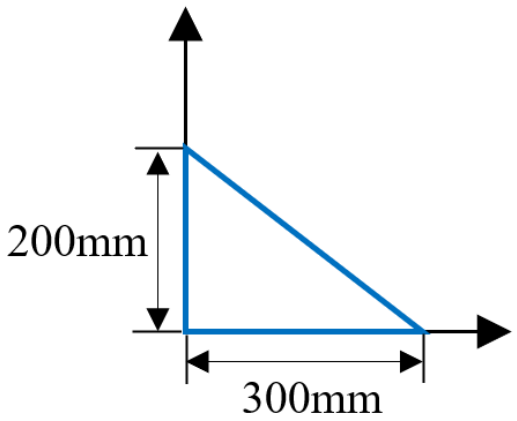
(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

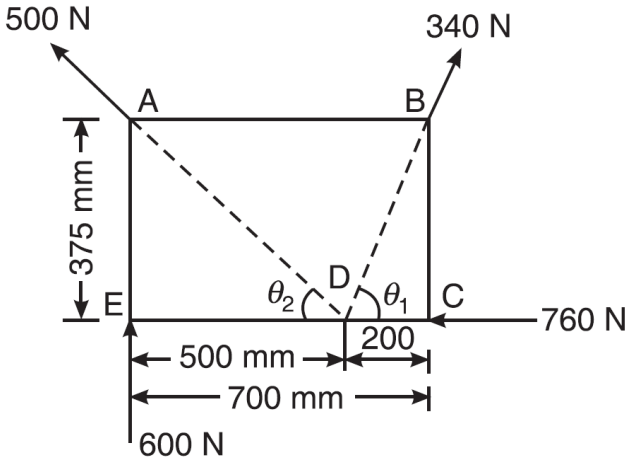
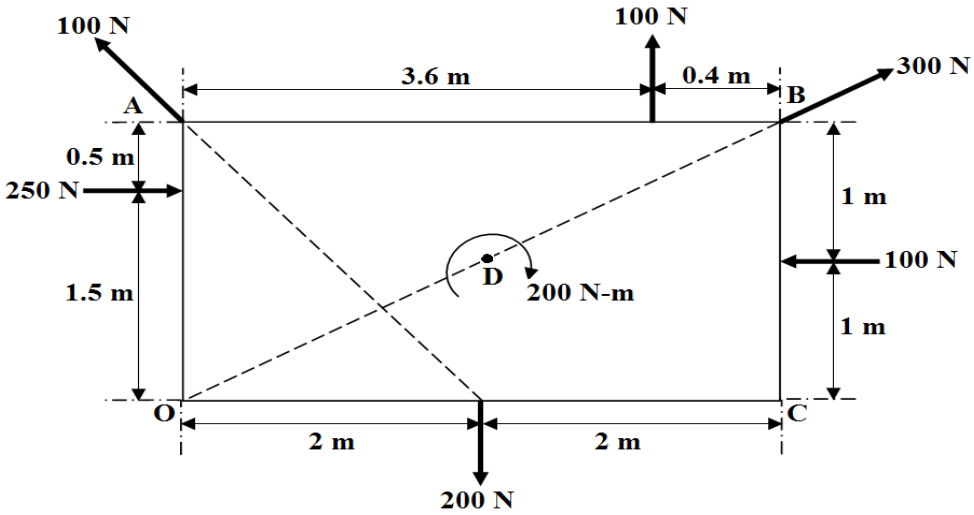
Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

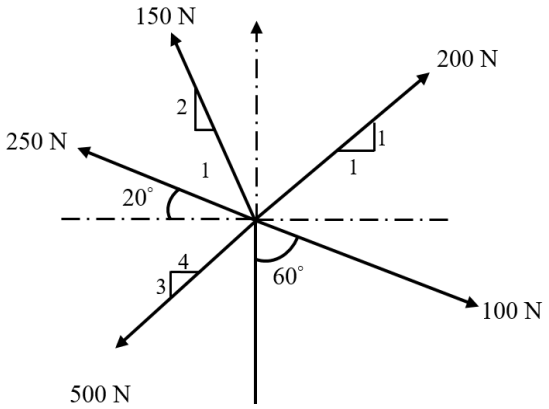
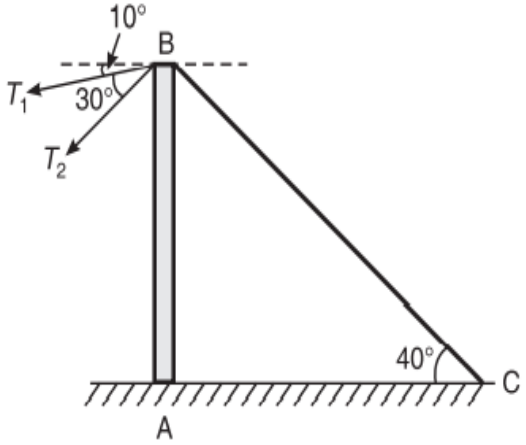
1.	What is Like parallel and unlike parallel forces. Demonstrate with the help of a sketch.	**2 Marks**	**L1**	**CO1**
2.	List out the properties of a couple	**2 Marks**	**L1**	**CO1**
3.	List the different types of coplanar force system	**2 Marks**	**L1**	**CO1**
4.	State the Principle of Transmissibility of force and the Principle of Physical Independence of Forces	**2 Marks**	**L1**	**CO1**
5.	Resolve the force shown in Fig. 5into vertical and horizontal components  **Fig. 5**	**2 Marks**	**L2**	**CO1**
6.	State Lami's Theorem	**2 Marks**	**L1**	**CO3**
7.	With the help of neat sketches, list any two types of supports.	**2 Marks**	**L1**	**CO4**
8.	State the laws of static Friction	**2 Marks**	**L1**	**CO5**
9.	Define coefficient of Friction and write the formula to compute coefficient of friction	**2 Marks**	**L1**	**CO5**

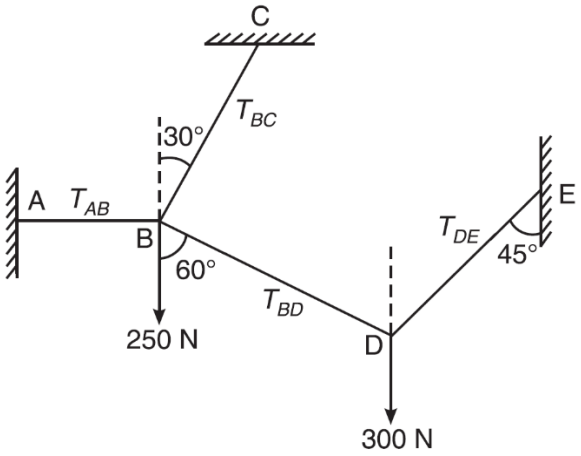
10.	Write the x coordinate and y coordinate of the centroid for the Triangle shown in figure 10.  **Fig. 10**	**2 Marks**	**L2**	**CO6**

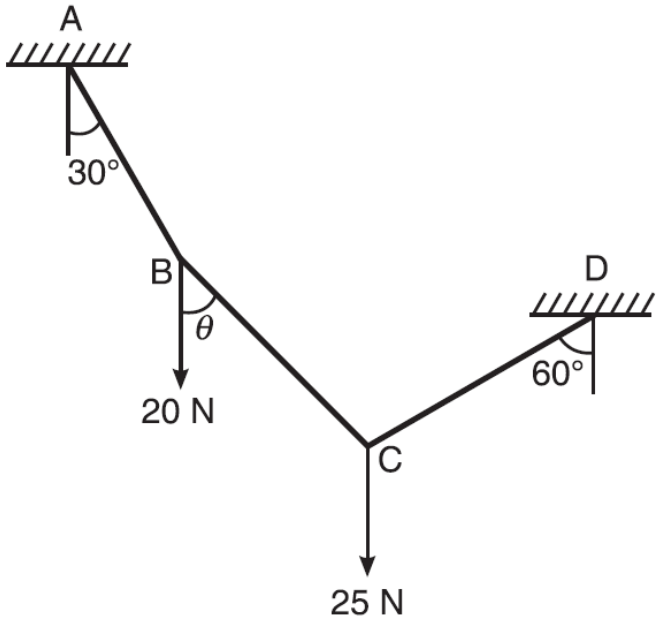
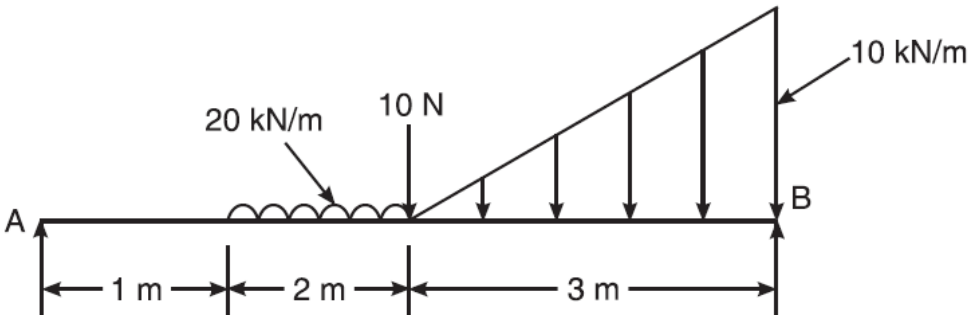
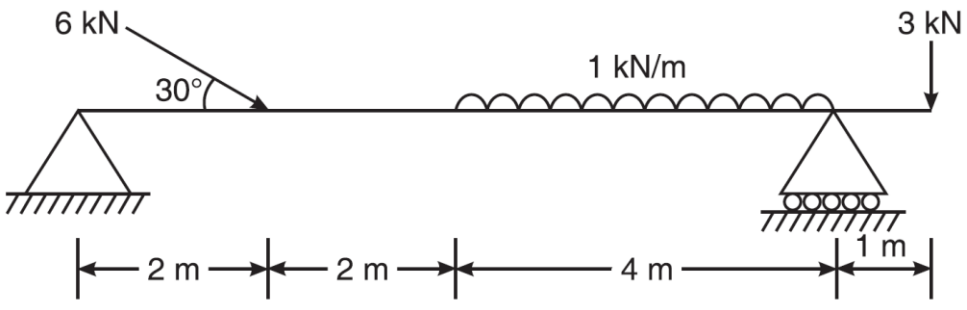
Part B

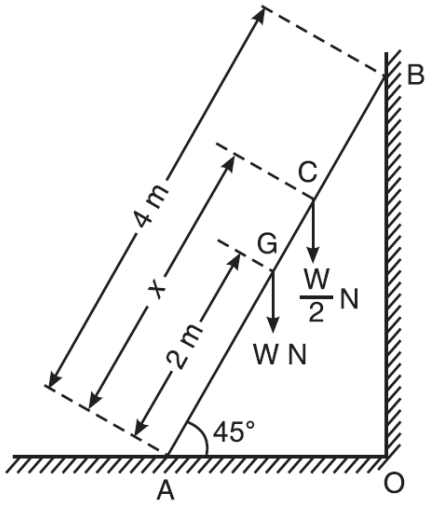
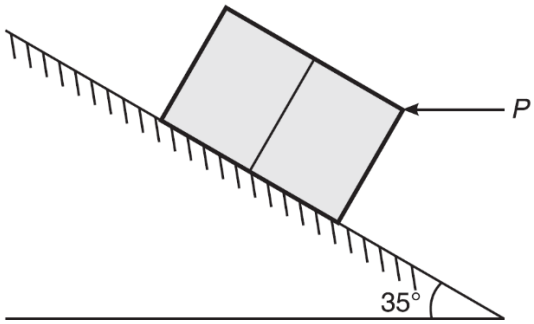
Answer the Questions. **Total Marks 80M**

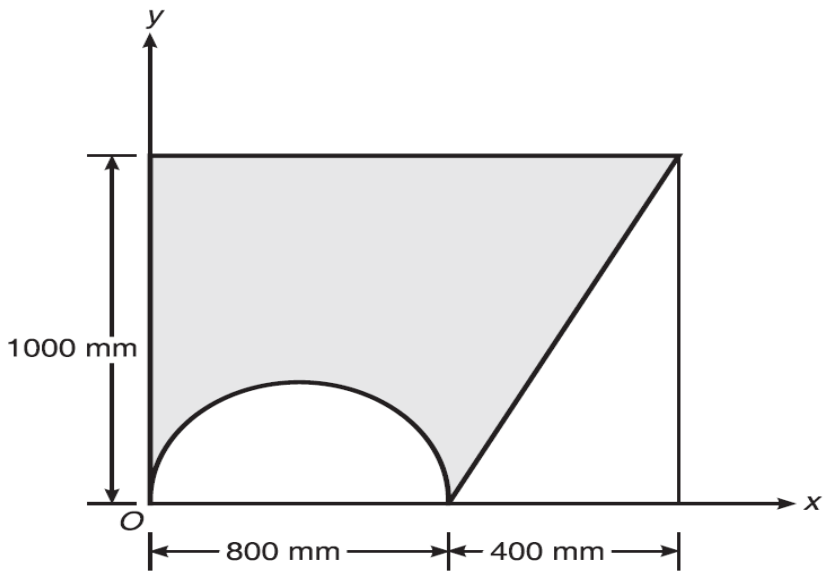
11.	**a.**	Determine the magnitude, direction and point of application of the resultant force for the system of coplanar forces shown in Fig 11(a). Locate position w.r.t. point A.  **Fig. 11(a)**	**10 Marks**	**L3**	**CO2**
		Or			
12.	**a.**	Determine the magnitude, direction and point of application of the resultant force w.r.t. O for the force system shown in Fig 12(a).  **Fig. 12 (a)**	**10 Marks**	**L3**	**CO2**

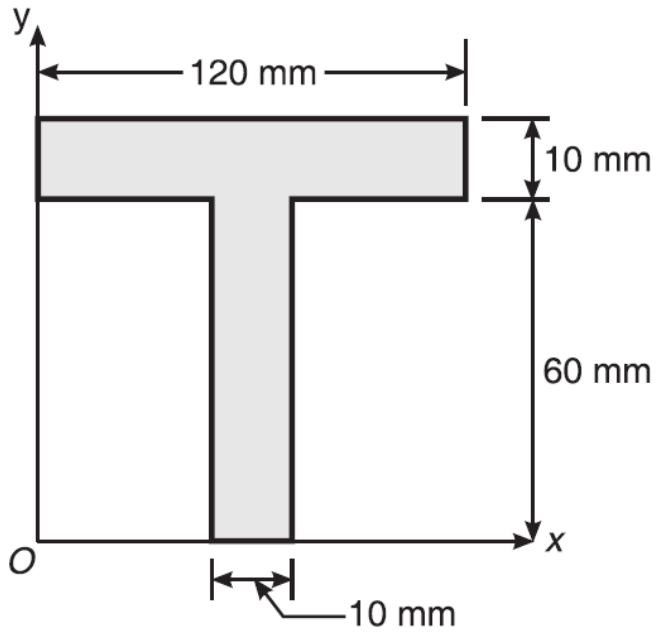
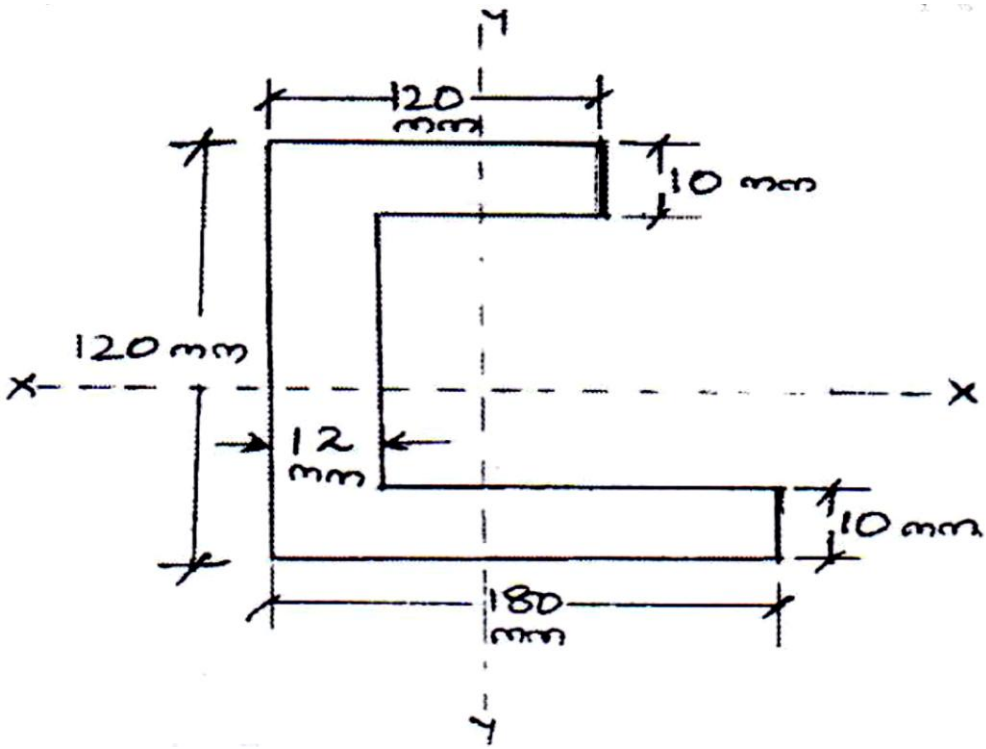
13.	**a.**	Determine Magnitude and direction of the Resultant for the Force system shown in Fig. 13(a)  **Fig. 13(a)**	**10 Marks**	**L3**	**CO2**
		Or			
14.	**a.**	Two cables which have known tensions **T1 = 2 kN** and **T2 = 4 kN** are attached at the point **B** of a mast **AB** as shown in Fig. 14(a). A third cable **BC** is used as a guy wire and is attached at **B.** Determine the required tension in cable **BC,** so that the resultant of the forces exerted by the three cables will be vertical. Also find the magnitude of the resultant.  **Fig. 14(a)**	**10 Marks**	**L3**	**CO2**

15.	**a.**	A system of connected flexible cables shown in Figure 15(a), is supporting two vertical forces 200 N and 250 N at points B and D. Determine the forces in various segments of the cable.  **Fig 15(a)**	**10 Marks**	**L3**	**CO3**

		Or			
16.	**a.**	Determine the angle θ for the system of strings ABCD in equilibrium as shown in Figure 16(a).  **Fig. 16(a)**	**10 Marks**	**L3**	**CO3**
17.	**a.**	Determine the reactions at the supports for the beam loaded as shown in Figure 17(a)  **Fig. 17 (a)**	**15 Marks**	**L3**	**CO4**
		Or			
18.	**a.**	Determine the support reactions of the overhanging beam shown in Figure 18(a)  **Fig. 18(a)**	**15 Marks**	**L3**	**CO4**

19.	**a.**	A uniform ladder of 4 m rests against a vertical wall with which it makes an angle of 45° as shown in Figure 19(a). The coefficient of friction between the ladder and the floor is 0.5. If the man whose weigh is one-half of that of ladder ascends it, how high will he be when the ladder slips?  **Fig. 19(a)**	**15 Marks**	**L2**	**CO5**
		Or			
20.	**a.**	The crate shown in Fig, 20(a) has a mass of 580 kg. What value of P will cause the crate to have impending motion up the plane? Find the minimum value of P required to keep crate from sliding down the plane. The coefficient of friction may be taken as 0.35.  **Fig. 20 (a)**	**15 Marks**	**L2**	**CO5**

21.	**a.**	Locate the centroid for the shaded area shown in Figure 21(a)  **Fig. 21(a)**	**15 Marks**	**L3**	**CO6**

	b.	Find the centroid for the T-section shown in Figure 21(b)  **Fig. 21 (b)**	**05 Marks**	**L2**	**CO6**
		Or			
22.	**a.**	State and prove parallel axis theorem	**05 Marks**	**L2**	**CO6**
	b.	Determine the moment of inertia of the section shown in Fig. 22(b) about its centroidal axes. Also, Calculate the least radius of gyration for the section as well.  **Fig. 22 (b)**	**15 Marks**	**L3**	**CO6**