MID SEMESTER EXAMINATION
B.Tech. (I) 2nd Semester, A to G Division
Engineering Mechanics
Civil Engineering Department, SVNIT, Surat

Date: 20/05/2021 **Time: 09:30 am to 11:30 am** **Marks: 30**

Instructions:

- All the questions are compulsory.
- Figures to the right indicate full marks for the question.
- Draw neat sketch wherever required
- All pages of the answer sheet must contain your enrolment no. and name at top of the sheet. Also total no. of pages must be mentioned on the first page of the answer-sheet before submitting.
- Answer sheets to be submitted in pdf format via **Google Classroom** of your **Respective Exam Block of Engineering Mechanics**.

1) Find the magnitude of two forces, such that if they act at right angles, their resultant is $\sqrt{10}$ kN, but if they act at 60°, their resultant is $\sqrt{13}$ kN. **(6)**

2) Derive centroidal coordinates of the quarter circular arc. **(6)**

3) a) Find the resultant of the force system shown in Figure 1. **(6)**
   b) Replace the given force and couple by a single force and couple system at A.

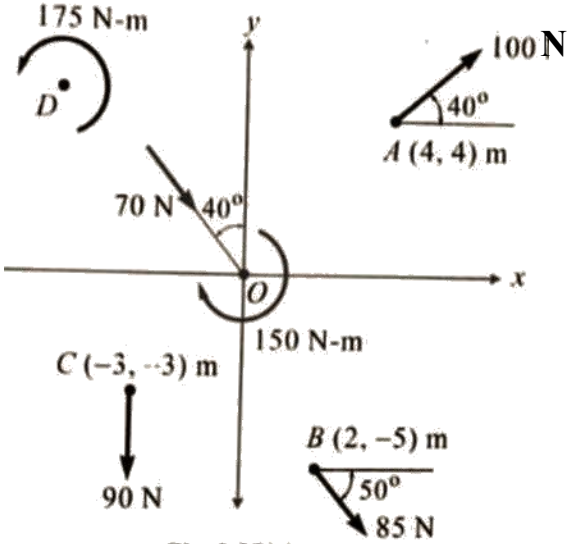

Figure 1

4) A smooth circular cylinder of radius 1.5 m is lying in triangular groove one side of which makes 15° angle and the other side 40° angle with the horizontal. Find the reactions at the surfaces of contact, if there is no friction and the cylinder weights 100 N **(6)**

OR

4) A frame ACD hinged at A and D and supported by a cable which passes through a ring at B and is attached to hook at G and H as shown in Figure 2. Knowing that the tension in the cable is 1200 N, determine the moment about the diagonal AD of the force exerted on the frame by portion BH of the cable. **(6)**

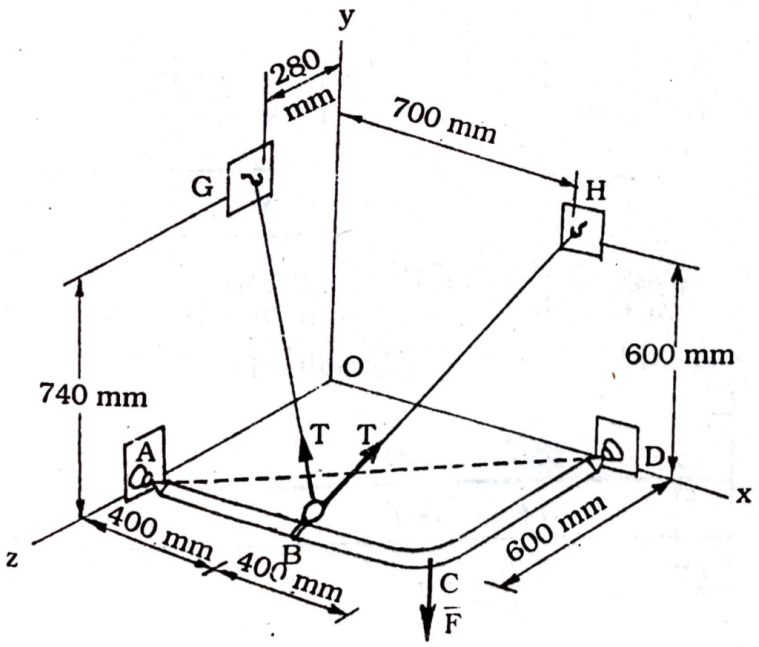

Figure 2

5) Calculate centroidal coordinates ($\bar{x}$, $\bar{y}$) of the shaded area as shown in Figure 3. **(6)**

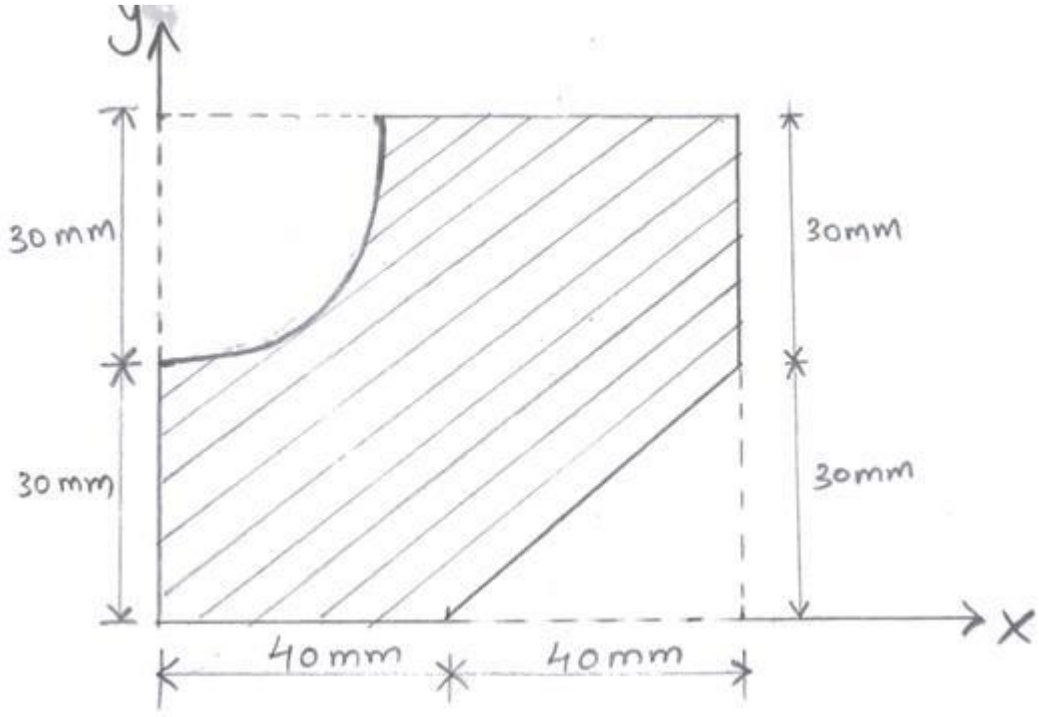

Figure 3

OR

5) Determine the moment of inertia about x-axis of the shaded area as shown in Figure 3. **(6)**

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