NATIONAL INSTITUTE OF TECHNOLOGY JAMSHEDPUR
Department of Mechanical Engineering (Autumn Mid Semester Exam - 2023)

Course Code: ME1101

Date: 20/10/2023 (Friday)

1st Sem. (2023 batch) B Tech (hons.)

Course Instructor: A K Prasad, V K Dalla, Bipin Kr.

Course Title: Engineering Mechanics

Duration: **02 hrs.**

Branch: PIE, ME, MME, ECM

Max. Marks: **30**

Answer All the Questions.
The figures in the right-hand margin indicate full marks for a question.

Q.1. (a) What are rectangular the components of 500N force passing from origin O to C as shown in Fig.1(a)? What are the direction cosines? [2.5]
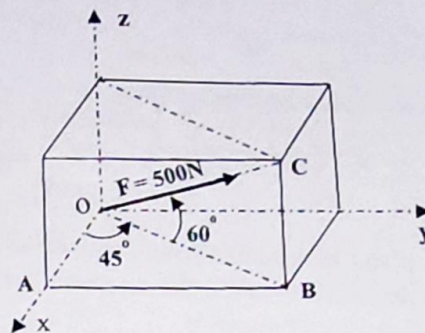

Fig. 1(a)

(b). Compute the simplest resultant for loads shown in Fig.1(b) acting on the beam. Find the intercept with axis of the beam. [3.5]
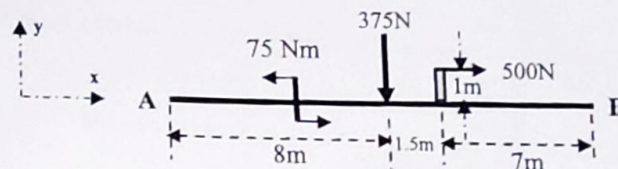

Fig. 1(b)

Q.2. Reduce the force system acting on the body as shown in Fig.2 to a wrench. Give the axis of the wrench by giving the point of intersection of the wrench with plane A. [4]
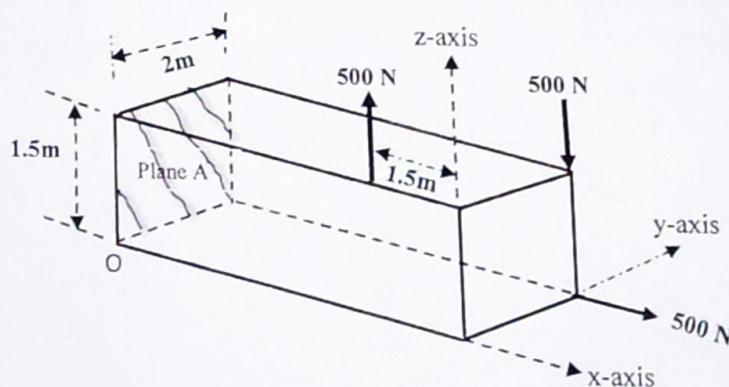

Fig. 2

Q.3. Block C as shown in Fig.3 has a mass of 100 kg and identical block A and B have masses of 75 kg each. If $\mu_s = 0.2$ for all contact surfaces, can the arrangement shown in Fig.3 remain in equilibrium?   [5]
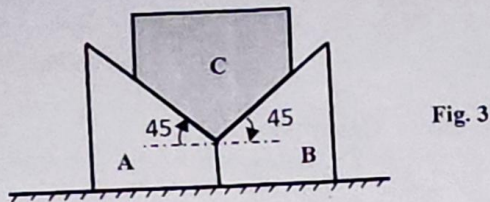

Fig. 3

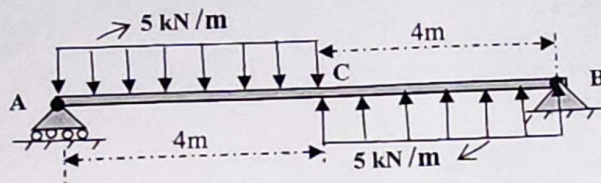**Q.4.** Draw the SFD and BMD for the beam AB loaded and supported as shown in Fig.4.   [5]

Fig.4

Q.5. (a) The moment of a given plane system of forces about three points (1,-1), (2,3) and (1,2) are 10, 12 and 21 respectively. Find the resultant force and equation of line through which resultant force pass through it.   [3]

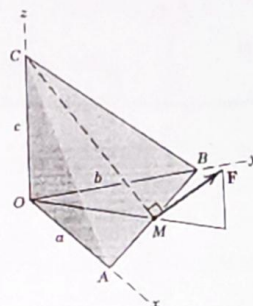**(b)** Determine the component of the force along each of the coordinate axis as shown in fig. 5.   [2]

Fig.5

Q. 6. A given truss as shown in fig. 6 with load is 100 kN. Determine the force exerted in the members DE, CE and CB respectively.   [5]
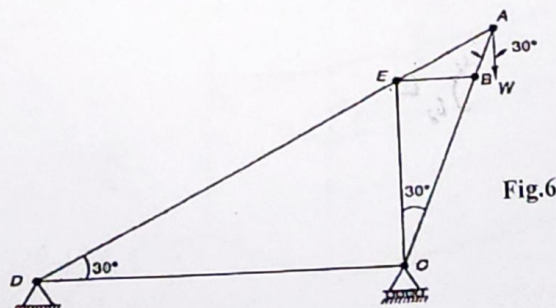

Fig.6

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Course Code: HS1101   Course Title: English for Communication
Course Instructors: Dr Rajiv Bhushan, Dr. Doreswamy   Branches: ME, MM, PI, ECM.
Date: 19 October 2023   Shift: A
Duration: 02 Hours   Max. Marks: 30

INSTRUCTIONS:
1) Answer **<u>Any Three</u>** of the following questions:
2) All questions are of equal value. Candidates have to answer all parts of a particular question, at one place only.
3) The figures in the right hand margin indicate full marks.

QUESTIONS:

1. Write a paragraph on **<u>Any Two</u>** of the following topics:

   a) My Institute.

   b) Artificial Intelligence: A Boon or Bane?

   c) Overcoming health problems.

   d) We all make mistakes.   (10)

2. Suppose you want to change your branch on the basis of your CGPA. Write an application, in the Block format, to the Dean (Academic), requesting him to upload all the details on the Institute Website so that the first year students may avail themselves of this facility.   (10)

3. The poem "The Unknown Citizen" is a powerful criticism of the tendency of some governments to invade the privacy of the individual citizens on every level. Discuss this statement with close reference to the poem.   (10)

4. How does John Keats draw the human world of sorrow in his poem, Ode to a Nightingale?   (10)