

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Mid-Semester Examination

Course No.: CEE 4201

Course Title: Analytic Mechanics

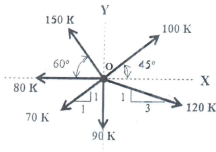
Summer Semester: 2022 - 2023

Full Marks: 100

Time: 1.5 Hours

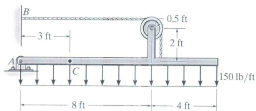
There are 3 (THREE) questions. Answer all questions. The symbols have their usual meaning. Assume any missing data.

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|------|---|-----|----|
| 1(a) | Briefly explain the differences between frame and truss using neat sketch. | CO1 | 5 |
| | | PO1 | |
| 1(b) | Explain limiting static frictional force and coefficient of static friction with a diagram. | CO1 | 5 |
| | | PO1 | |
| 1(c) | Write down the differences between two-force member, multi-force member and zero-force member. Show qualitative free-body diagrams for these members in order to explain your answer. | CO1 | 5 |
| | | PO1 | |
| 1(d) | Briefly explain tight tension and slack tension with a figure. | CO1 | 5 |
| | | PO1 | |
| 2(a) | Several coplanar and concurrent forces are acting at point O as shown below. | CO2 | 10 |
| | | PO2 | |

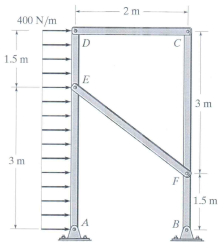


Calculate the resultant of the forces. Is point O in static equilibrium? If not, what forces are required to be applied in X and Y directions for point O to attain static equilibrium.

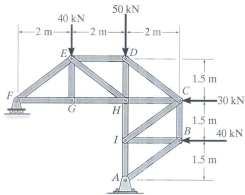
- 2(b) Refer to the following figure. Determine the internal normal force, shear force and bending moment at point C. CO2 10
PO2



- 2(e) i. Determine the horizontal and vertical components of reactions at A and B for the following frame. CO2 20
PO2
- ii. Identify the two-force and multi-force members. Determine the internal forces of the two-force members. Indicate if the two-force members are in tension or compression.



- 3(a) i. Determine the internal forces in members ED, EH, DC, and DH of the following truss using Method of Sections. Indicate tension and compression members. CO3 20
PO3
- ii. Verify your calculation for ED, DC, and DH members from the free-body diagram of joint D.



- 3(b) Blocks A and B have a mass of 7 kg and 10 kg, respectively. Using the coefficients of static friction indicated, determine the largest force P which can be applied to the cord without causing motion. Assume that the pulleys at C and D are frictionless. CO3 20
PO3

