

UNIVERSITY OF TORONTO
Faculty of Applied Science and Engineering
CIV100F and APS160F – MECHANICS
Midterm Examination – Sections 1, 2, 3, 4, 5, 6, 7, 8 and Online
Tuesday, 23rd October 2018
Examiner: Staff in Civil Engineering
Time allowed: 1-½ hours

SURNAME: _____ **GIVEN NAME(S):** _____
(Please print clearly)

STUDENT NUMBER: ____Solutions____ **DEPT. (ECE, Track One, etc.)** _____

CIRCLE YOUR SECTION AND THE NAME OF YOUR INSTRUCTOR:

- | | | |
|---------------------|--------------------|------------------------|
| 1. El-Diraby, Tamer | 5. Bruun, Edvard | Online. Seica, Michael |
| 2. Packer, Jeffrey | 6. Saxe, Shoshanna | |
| 3. Seica, Michael | 7. Mercan, Oya | |
| 4. Packer, Jeffrey | 8. Panesar, Daman | |

CIRCLE YOUR CALCULATOR TYPE:

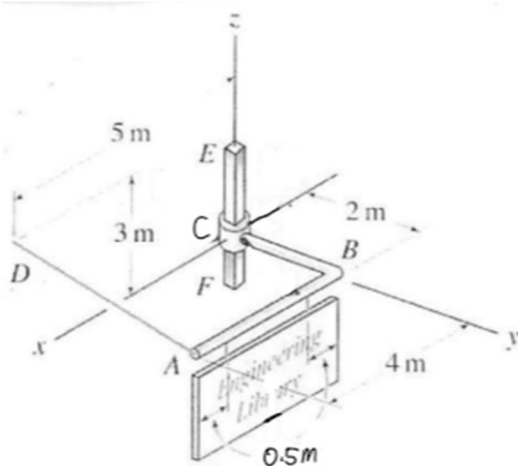
CASIO 991

SHARP 520

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- Notes:**
1. Ensure that you have all 4 pages of the examination paper. Page 4 is blank.
 2. Answer all three questions. The value of the questions is indicated below.
 3. If you need more space for a question, continue only on the page indicated at the bottom.
 4. The only calculators permitted are listed above. Please circle your model.
 5. This is a closed-book examination. No other paper will be allowed on the desk.
 6. Do not remove the staple.
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DO NOT WRITE IN THIS SPACE.

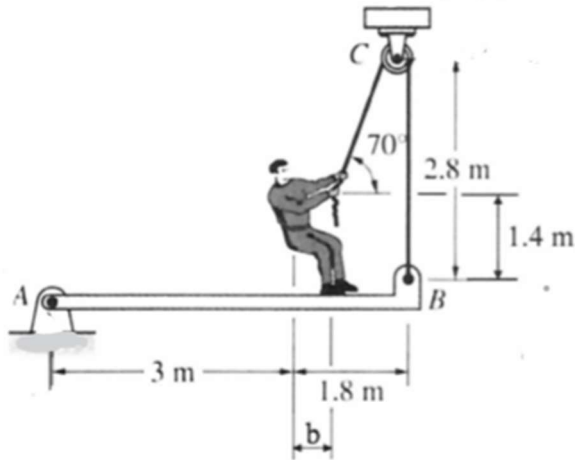
1. Bar EF has a square cross-section and is fixed in space. The structure ABC has negligible weight and has a collar at C which has a square hole, that slides freely on bar EF . The structure ABC supports a uniform rectangular sign having a weight of 1 kN , acting at the centre of the sign. The vertical edges of the sign align vertically with points A and B . Determine the magnitude of the force in cable AD and all the reaction components at C .



NAME: _____

Page 4 of 8

2. A man supports himself and the uniform, horizontal beam AB , having a rough surface, by pulling on the rope with a force T . The mass of the man is 90 kg and that of the beam is 5.2 kg/m . The total weight of the beam acts at the mid-span of the beam. Compute the tension, T , in the rope and the reaction force components at the pin at A . In addition, calculate the distance b , locating the man's feet, and determine the forces exerted on the man by the beam.



NAME: _____

Page 6 of 8

3. The bracket illustrated is subjected to three cable forces, as indicated. Determine an equivalent force system consisting of a *single* resultant force and determine the x -coordinate of the point where its line of action intersect the x -axis.

