

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:

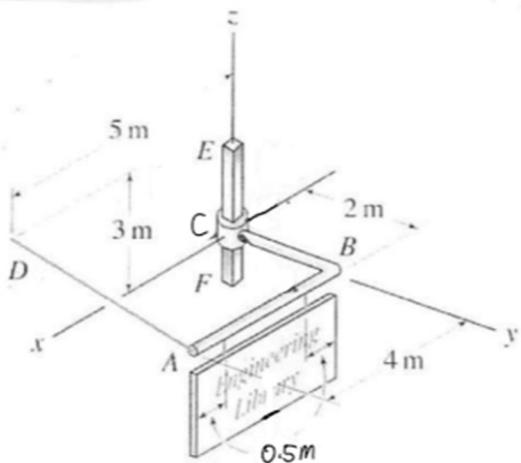
CASIO 991

SHARP 520

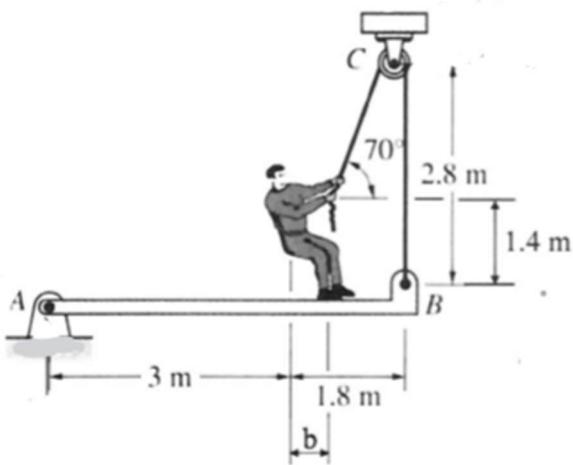
- Notes:**
1. Ensure that you have all 4 pages of the examination paper. Page 4 is blank.
 2. Answer all three questions. The value of the questions is indicated below.
 3. If you need more space for a question, continue only on the page indicated at the bottom.
 4. The only calculators permitted are 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.
-

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 .



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.



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.

