**Polytechnic University of the Philippines**

**College of Institute of Technology**

**Department of Engineering Technology**

**Problem Set No. 2**

**CHAPTER 4-5**

**Cubacub, Micaella G. \_\_\_\_\_\_\_\_\_\_\_\_\_**

**DCvET 3-1 2022-11944-MN-0**

**Statics of Rigid Bodies**

**Saturday 10:30 AM – 1:30 PM**

**December 21, 2024**

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| NAME: ENGR. CUBACUB MICAELLA G. | STUDENT NO: 2022-11944-MN-0 |  |
| INSTRUCTOR. ENGR. ALDRIN LUMBANG | DATE SUBMITTED: DEC 21, 2024 |
| **Preliminary Problem**  **P4-1** In each case, determine the moment of the force about point O. | | |
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| **Preliminary Problem**  **P4-2**. In each case, set up the determinant to find the moment of the force about point P. | | |
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| **Chapter 4 Problem**  **4-5**. Determine the moment about point B of each of the three forces acting on the beam. | | |
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| **Chapter 4 Problem**  **4-10.** If FB = 30 lb and FC = 45 lb, determine the resultant moment about the bolt located at A.. | | |
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| **Chapter 4 Problem**  **4-16**. If the man at B exerts a force of P = 30 lb on his rope, determine the magnitude of the force F the man at C must exert to prevent the pole from rotating, i.e., so the resultant moment about A of both forces is zero. | | |
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| **Chapter 4 Problem**  **4-28\*4–28**. Determine the moment of the force F about point P. Express the result as a Cartesian vector. | | |
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| **Chapter 4 Problem**  **4-44**. The pipe assembly is subjected to the 80-N force. Determine the moment of this force about point B. | | |
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| **Chapter 4 Problem**  **4-46** The force F = {6i + 8j + 10k} N creates a moment about point O of MO = {-14i + 8j + 2k} N # m. If the force passes through a point having an x coordinate of 1 m, determine the y and z coordinates of the point. Also, realizing that MO = Fd, determine the perpendicular distance d from point O to the line of action of F. Note: The figure shows F and MO in an arbitrary position. | | |
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| **Preliminary Problem**  **P4-3**. In each case, determine the resultant moment of the forces acting about the x, y, and z axes. | | |
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| **Preliminary Problem**  **P4-4.** In each case, set up the determinant needed to find the moment of the force about the a–a axes.. | | |
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| **Chapter 4 Problem**  **4-57** Determine the moment of this force F about an axis extending between A and C. Express the result as a Cartesian vector.. | | |
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| **Chapter 4 Problem**  **4-60**. The A-frame is being hoisted into an upright position by the vertical force of F = 80 lb. Determine the moment of this force about the y axis when the frame is in the position shown. | | |
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| **Fundamental Problem**  **F4-22** Determine the couple moment acting on the beam.. | | |
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| **Fundamental Problem**  **F4-23**. Determine the resultant couple moment acting on the pipe assembly. | | |
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| **Chapter 4 Problem**  **4-71.** Two couples act on the beam. Determine the magnitude of F so that the resultant couple moment is 450 lb # ft, counterclockwise. Where on the beam does the resultant couple moment act? | | |
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| **Chapter 4 Problem**  **4-81**. Two couples act on the frame. If d = 4 ft, determine the resultant couple moment. Compute the result by resolving each force into x and y components and (a) finding the moment of each couple (Eq. 4–13) and (b) summing the moments of all the force components about point B. | | |
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| **Chapter 4 Problem**  **4-84.** Determine the magnitudes of couple moments M1, M2, and M3 so that the resultant couple moment is zero. | | |
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| **Preliminary Problem**  **P4-5.** In each case, determine the x and y components of the resultant force and the resultant couple moment at point O. | | |
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| **Chapter 4 Problem**  **4-98** Replace the force system by an equivalent resultant force and couple moment at point P. | | |
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| **Chapter 4 Problem**  **4-107.** A biomechanical model of the lumbar region of the human trunk is shown. The forces acting in the four muscle groups consist of FR = 35 N for the rectus, FO = 45 N for the oblique, FL = 23 N for the lumbar latissimus dorsi, and FE = 32 N for the erector spinae. These loadings are symmetric with respect to the y–z plane. Replace this system of parallel forces by an equivalent force and couple moment acting at the spine, point O. Express the results in Cartesian vector form. | | |
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| **Chapter 4 Problem**  **4-118**. Replace the loading acting on the beam by a single resultant force. Specify where the force acts, measured from B. | | |
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| **Chapter 4 Problem**  **4-131.** The building slab is subjected to four parallel column loadings. Determine F1 and F2 if the resultant force acts through point (12 m, 10 m). | | |
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| **Chapter 4 Problem**  **4-146** Replace the distributed loading by an equivalent resultant force and couple moment acting at point A. | | |
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| **Chapter 4 Problem**  **4-150.** Replace the loading by an equivalent force and couple moment acting at point O. | | |
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| **Chapter 4 Problem**  **4-162.** Wet concrete exerts a pressure distribution along the wall of the form. Determine the resultant force of this distribution and specify the height h where the bracing strut should be placed so that it lies through the line of action of the resultant force. The wall has a width of 5 m. | | |
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| **Chapter 5 Problem**  **5-10**. Determine the components of the support reactions at the fixed support A on the cantilevered beam. | | |

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| **Chapter 5**  **5-36**. The beam of negligible weight is supported horizontally by two springs. If the beam is horizontal and the springs are unstretched when the load is removed, determine the angle of tilt of the beam when the load is applied. | | |
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| **Chapter 5 Problem**  **5-41.** The bulk head AD is subjected to both water and soil-backfill pressures.  Assuming AD is “pinned” to the ground at A, determine the horizontal and vertical  reactions there and also the required tension in the ground anchor BC necessary  for equilibrium. The bulk head has a mass of 800 kg. | | |

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| **Chapter 5 Problem**    **5-47.** Determine the reactions at the pin A and the tension in cord BC. Set F = 40 kN.  Neglect the thickness of the beam. | | | | |
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| **Fundamental Problem**  **5-57.** The beam is subjected to the two concentrated loads. Assuming that the  foundation exerts a linearly varying load distribution on its bottom, determine  the load intensities w1 and w2 for equilibrium if P = 500 lb and L = 12 ft. | | | | |
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| **Chapter 5 Problem**  **5-67.** The uniform concrete slab has a mass of 2400 kg. Determine the tension in each of the three parallel supporting cables when the slab is held in the horizontal  plane as shown. | | | | |
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| **Chapter 5 Problem**  **5-82**. The sign has a mass of 100 kg with centre of mass at G. Determine the x, y, z components of reaction at the ball-and-socket joint A and the tension in wires BC and BD. | | | | |
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| **Chapter 3 Problem**  3–27. Each cord can sustain a maximum tension of 500 N. Determine the largest mass of pipe that can be supported. | | | | |
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| **Chapter 3 Problems**  3–43. The three cables are used to support the 40-kg flowerpot. Determine the force developed in each cable for equilibrium. | | | | |
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| **Chapter 3 Problems**  3–53. If the tension developed in each cable cannot exceed 300 lb, determine the largest weight of the crate that can be supported. Also, what is the force developed along strut AD? | | | | |
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| **Chapter 3 Problems**  3–59. Determine the tension developed in the three cables required to support the traffic light, which has a mass of 20 kg. Take h = 3.5 m. | | | | |
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| **Chapter 3 Problems**  3–67. Determine the maximum weight of the crate so that the tension developed in any cable does not exceed 450 lb. | | | | |
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