

Level : B.E./B.Sc.
Year : I
Time : 2 hrs. 30 mins.

21 JUL 2024

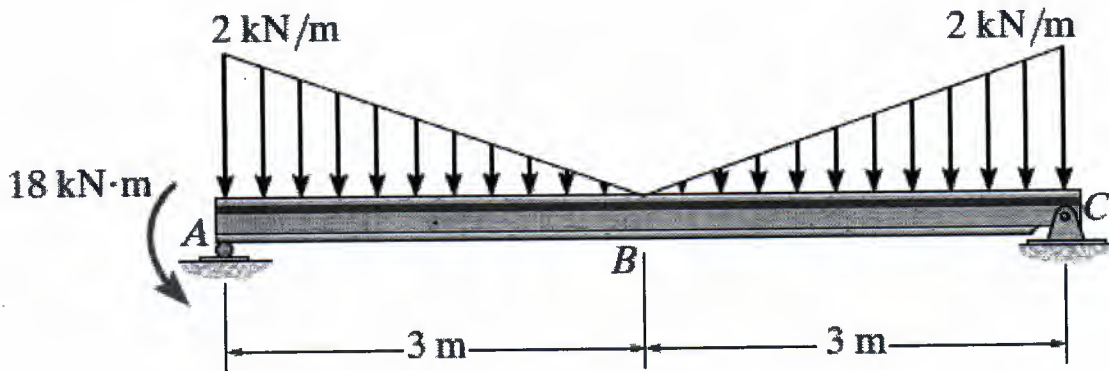
Course : ENGG 111
Semester : I
F. M. : 55

Instructions:

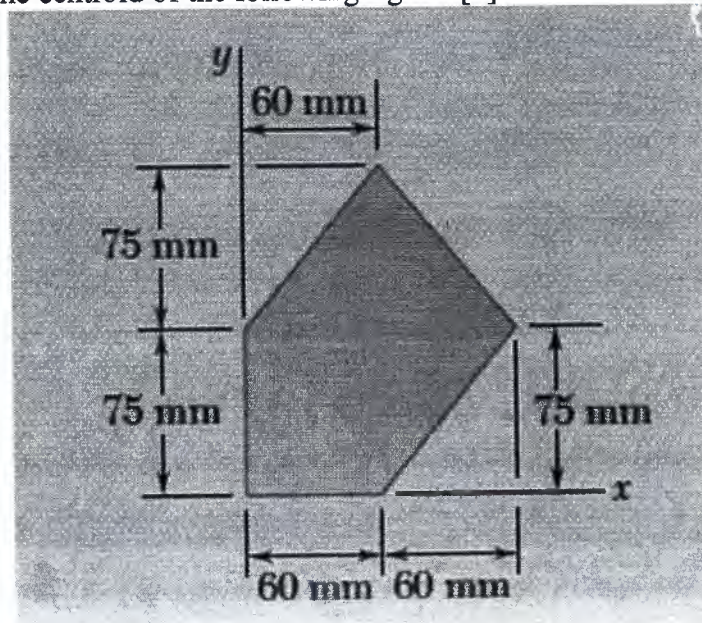
- Students are asked to attempt all questions.
- Assume suitable data if missing.
- Use different answer sheets for different sections B, C and D.
- Numbers in the bracket refer to the marks the question carries.

SECTION "B"
[33 marks]

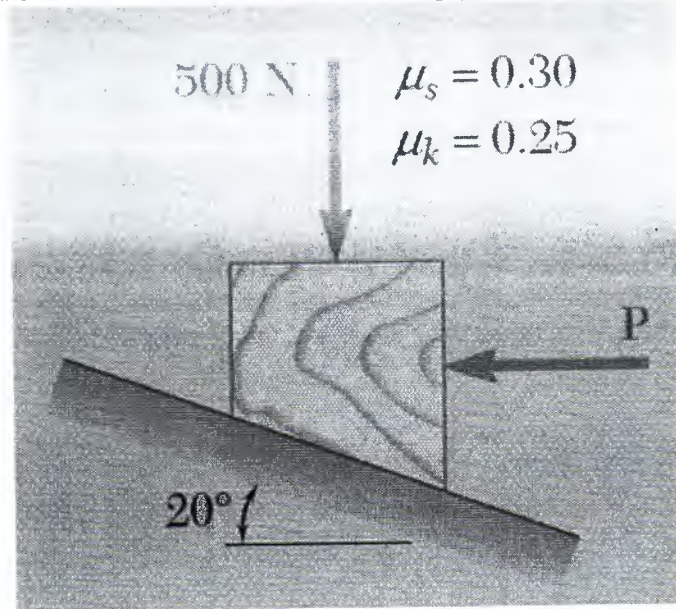
1. Determine the reactions at the supports. [5]



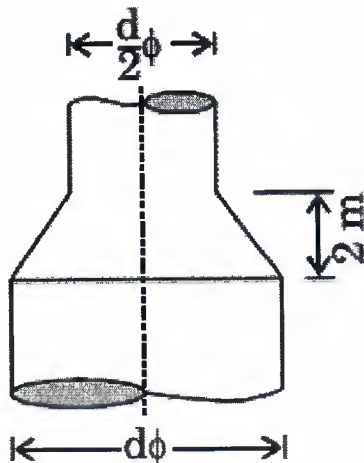
2. Determine the centroid of the following figure. [5]



3. Determine whether the block shown is in equilibrium, and find the magnitude and direction of the friction force when $P = 400 \text{ N}$. [5]



4. Write two major differences between open and closed systems (only in terms of mass and energy). A gas contained in a cylinder is compressed, the work required for compression being 5000 kJ . During the process, heat interaction of 2000 kJ causes the surroundings to be heated. Find the change in the internal energy of the gas during the process. [2+2]
5. Write the most common example of a compression ignition engine. Define swept volume, clearance volume, and stroke. [1+1+1+1]
6. What does Hook's law state? State the difference in stress-strain curves for ductile and brittle materials (Draw the figure and label them). [1+2]
7. Define streamline. Water flows through a vertical contraction from a pipe of diameter d to another of diameter $d/2$. The flow velocity at the inlet to the contraction is 2 m/s and pressure is 200 kN/m^2 . If the height of the contraction measures 2 m , then find the pressure at the exit of the contraction. [1+4]



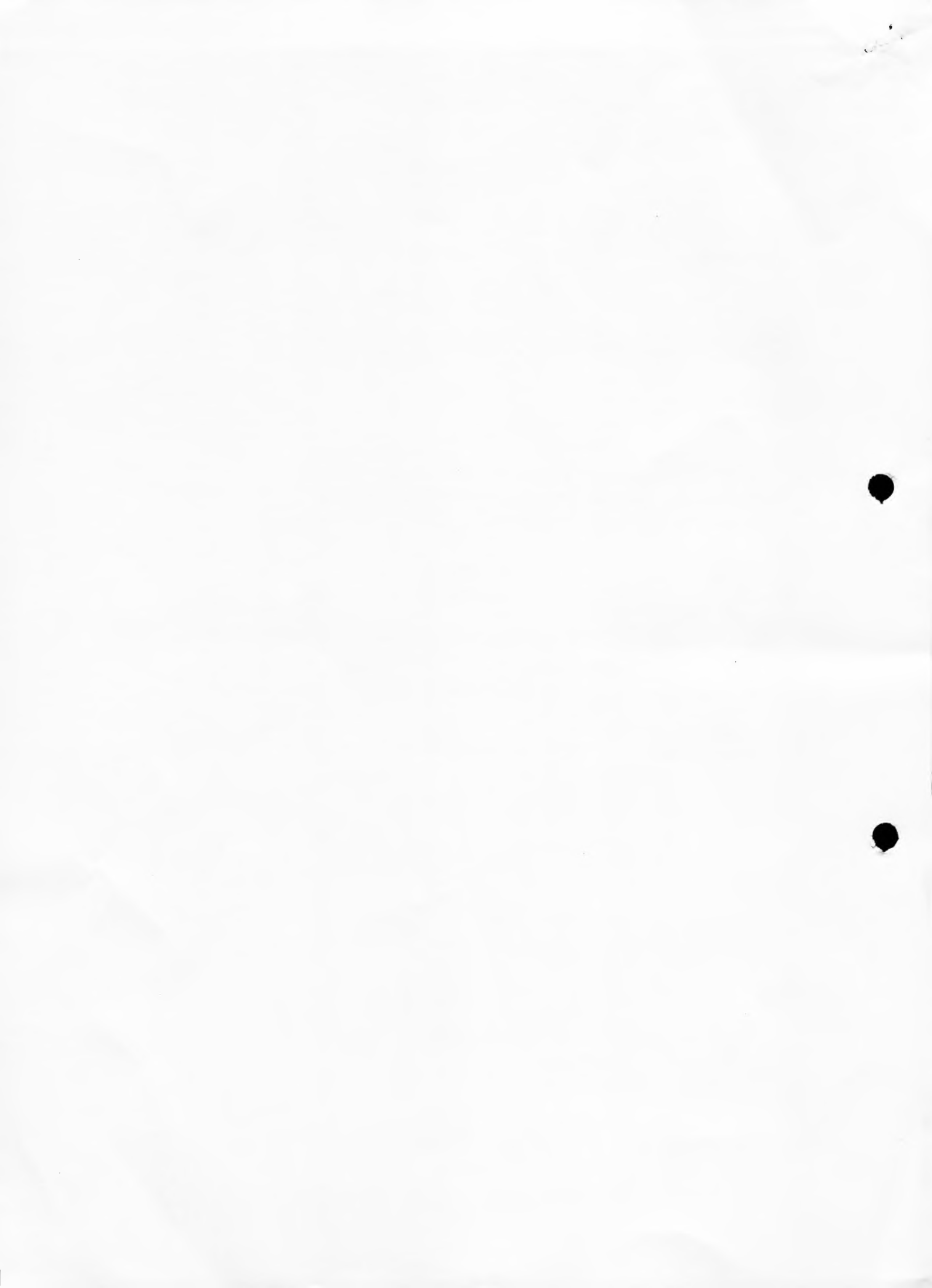
8. Write a major difference between a pump and a turbine in terms of what they do to the fluid. with an example of each. [2]

SECTION "C"
[11 marks]

9. For a load-bearing stone masonry boundary wall, explain the type of foundation you prefer for construction. Write down the types of mat foundations with a neat sketch. [2+2=4]
10. Describe the function of each important ingredient of Cement. [3]
11. Differentiate between load-bearing structures and framed structures with the help of figures. [2]
12. In the rainy season, news about the failure/damage of bridges is common in Nepal, illustrate some reasons for the failure/damage of bridges in the rainy season in Nepal and give suitable solution measures. [2]

SECTION "D"
[11 marks]

13. What is Surveying? Explain about the major principles of surveying in brief. [1+3]
14. Explain about the basic components of a Geographic Information System (GIS). [4]
15. Illustrate the difference between active and passive remote sensing systems. [3]



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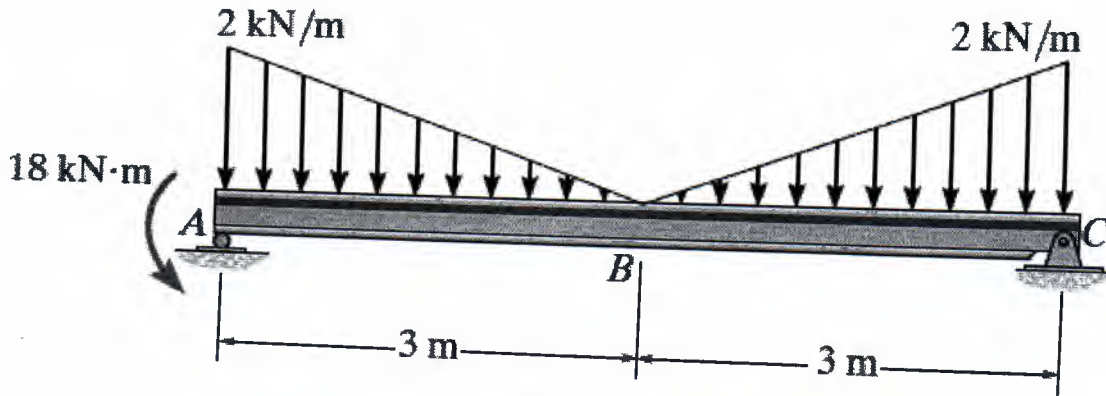
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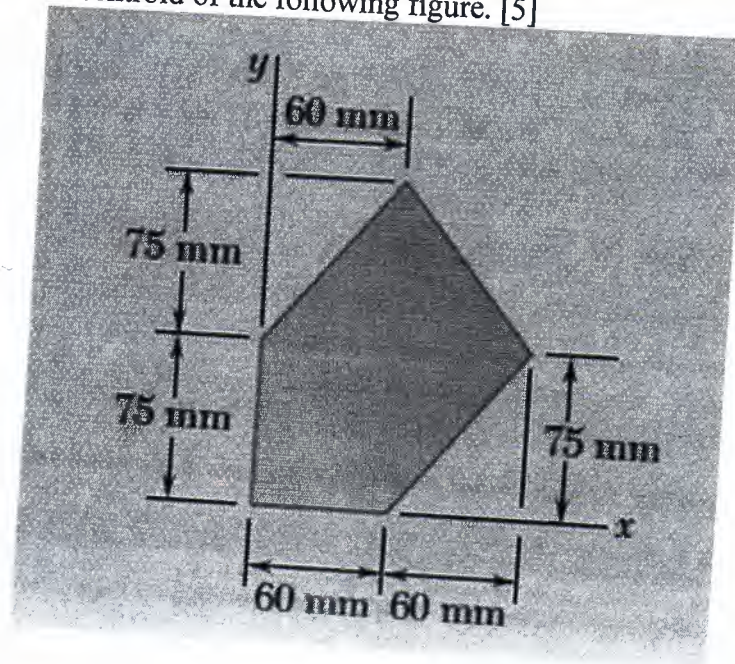
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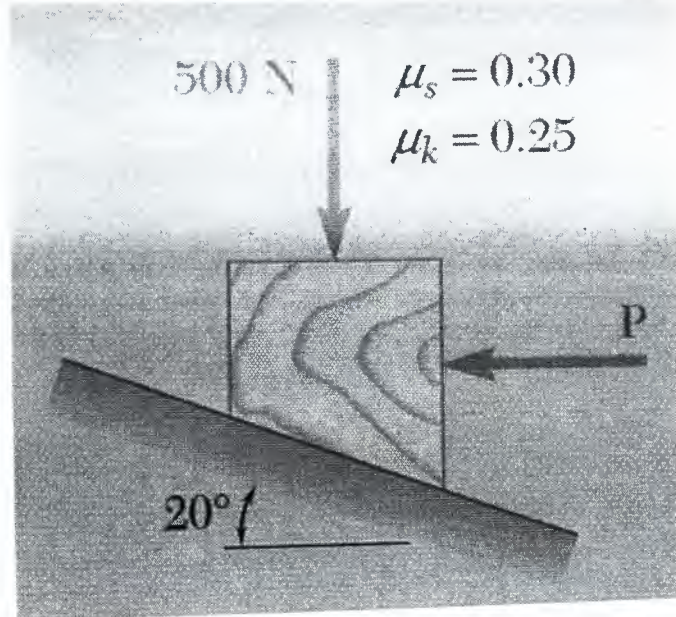
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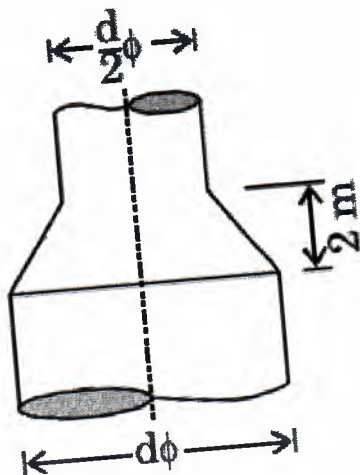
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