



Roll No.

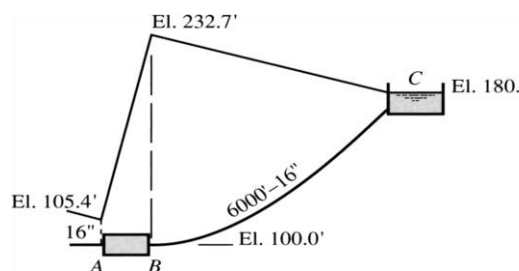
National Institute of Technology Hamirpur
B. Tech. (Chemical Engineering) – 3rd Semester
End Semester Examination 2020-21
CHD-211 Fluid Mechanics

Duration: 2 hours

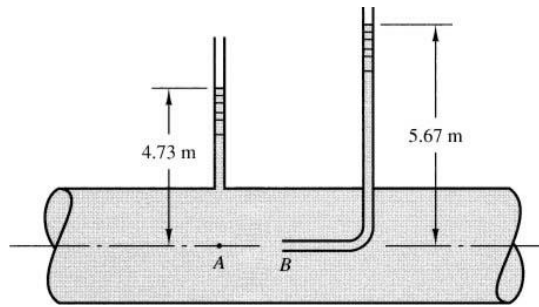
Max. Marks: 50

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- Make suitable assumptions if necessary, by clearly mentioning them.
 - Marks will be deducted for omitting steps.
 - Copying may reduce marks.
 - Submit the answer sheets within 10 minutes of examination time (12:10 PM).
 - Answer sheet will not be considered after the submission time (12:10 PM).
 - Write roll number, subject code and subject name at the top of answer sheet.
 - Do signature with date at the bottom of each page.
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1. How are pressure and fluid velocity related in steady, incompressible, inviscid (potential) flows? **(10 Marks)**
2. Show that the Bernoulli equation applies in steady, inviscid, flows in which $\nabla \times \underline{v}$ is not zero (rotational flows), if properly applied along a streamline. **(10 Marks)**
3. Medium fuel oil at 50°F is pumped to tank C (see Fig below) through 6000 ft of new, riveted steel pipe, 16" inside diameter. The pressure at A is +2.00 psi when the flow is 7.00 cfs. (a) What power must pump AB supply to the oil, and (b) what pressure must be maintained at B? Draw the hydraulic grade line. **(10 Marks)**



4. A Pitot tube having a coefficient of 0.98 is used to measure the velocity of water at the center of a pipe. The stagnation pressure head is 5.67 m and the static pressure head in the pipe is 4.73 m. What is the velocity? **(10 Marks)**



5. A centrifugal pump discharged $0.019 \text{ m}^3/\text{s}$ against a head of 16.8 m when the speed was 1500 rpm . The diameter of the impeller was 320 mm , and the brake power was 4.5 kW . A geometrically similar pump 380 mm in diameter is to run at 1750 rpm . Assuming equal efficiencies, (a) what head will be developed, (b) how much water will be pumped, and (c) what brake power will be developed? **(10 Marks)**