

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III (NEW) EXAMINATION – WINTER 2021****Subject Code:3133608****Date:23-02-2022****Subject Name:Basics of Fluid Flow****Time:10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

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|------------|---|-----------|
| Q.1 | (a) Explain the different pressure measurement scales. | 03 |
| | (b) What is meant by Potential flow? Specify its characteristics. | 04 |
| | (c) A crude oil of viscosity 0.97 poise and sp. Gravity 0.9 is flowing through a horizontal circular pipe of diameter 100 mm and length 10 m. calculate the difference of pressure at two ends of pipe, if 100 kg of oil is collected in a tank in 30 sec. | 07 |
| OR | | |
| Q.2 | (a) Mention classification of fluids based on Newton's law of viscosity. | 03 |
| | (b) Water is flowing through a pipe of inside diameter 50mm with a volumetric flow rate of $0.00063\text{m}^3/\text{sec}$. Calculate mass flow rate and mass velocity of water. | 04 |
| | (c) What is terminal settling velocity? Mention the regime in which a particle settles under such conditions. | 07 |
| OR | | |
| | (c) Explain the concept of fluidization mentioning various types with their application in various industries. | 07 |
| OR | | |
| Q.3 | (a) Differentiate between Uniform flow and Non-uniform flow. | 03 |
| | (b) Discuss differences between skin friction and form friction. | 04 |
| | (c) Derive ergun equation. | 07 |
| OR | | |
| Q.3 | (a) Write the significance of Reynolds Number. | 03 |
| | (b) Explain the concept of flow in non-circular cross sections | 04 |
| | (c) Derive the relationship between skin friction and wall shear. | 07 |
| Q.4 | (a) State various types of joints. | 03 |
| | (b) With a neat diagram explain the working principle of rotameter. | 04 |
| | (c) A venture meter is installed in a 25 mm internal diameter pipe line having throat diameter 15 mm. The pressure drop across the upstream side and throat of the venture meter is two meters of water. Calculate the volumetric flow rate of water in m^3/s through the pipe line. | 07 |
| OR | | |
| Q.4 | (a) List various types of valves and mention their specific application in chemical industry. | 03 |
| | (b) Differentiate: Variable head meter and variable area meter | 04 |
| | (c) An orifice meter consisting of 100mm diameter orifice in a 250 mm diameter pipe has a $C_d = 0.65$. The pipe delivers oil of specific gravity 0.8. The pressure difference on two sides of the orifice plate is measured by a mercury oil differential manometer. If the differential gauge reading is 800 mm of mercury, find the rate of flow in liters/sec. | 07 |

- Q.5** (a) What is static head, dynamic head and total head in pump? **03**
(b) When priming is required in centrifugal pump? **04**
(c) Explain: Characteristic curves of centrifugal pump. **07**

OR

- Q.5** (a) Explain the concept NPSH **03**
(b) Explain working of rotary blower. **04**
(c) Benzene is pumped at a rate of $9.09 \text{ m}^3/\text{h}$ from a reservoir at atmospheric pressure. The pump suction is 1.3 m above the level in the reservoir. The diameter of the discharge line is 40 mm. The friction in the suction line is 3.45 kN/m^2 . The density of benzene is 865 kg/m^3 and its vapour pressure at the temperature of pumping is 26.2 kN/m^2 . Calculate: The net positive suction head. **07**
