

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-III(New) EXAMINATION – SUMMER 2016**

**Subject Code:2130602****Date:04/06/2016****Subject Name:Fluid Mechanics****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.

|            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | MARKS                               |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| <b>Q.1</b> | <b>Short Questions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>14</b>                           |
|            | <ol style="list-style-type: none"><li>1 What do you meant by ideal fluid?</li><li>2 Define Newtonian fluid.</li><li>3 What do you meant by TEL and HGL</li><li>4 Define Path line.</li><li>5 What is pressure head?</li><li>6 Define coefficient of discharge (<math>C_d</math>)</li><li>7 What is sonic flow?</li><li>8 Define term "Total pressure."</li><li>9 What is compound pipe?</li><li>10 Define rotational flow.</li><li>11 What is stagnation point?</li><li>12 Define Mach Number.</li><li>13 Define steady flow.</li><li>14 What is buoyant force?</li></ol> |                                     |
| <b>Q.2</b> | <ol style="list-style-type: none"><li>(a) Explain the terms Dynamic Viscosity and Kinematics Viscosity.</li><li>(b) Explain piezometer.</li><li>(c) What is Euler's equation of motion? How will you obtain Bernoulli's equation from it?</li></ol>                                                                                                                                                                                                                                                                                                                       | <b>03</b><br><b>04</b><br><b>07</b> |
|            | <b>OR</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                     |
|            | <ol style="list-style-type: none"><li>(c) A circular tank of diameter 5 m contains water up to a height of 4.5 m. the tank is provided with an orifice of diameter 0.5 m at the bottom. Find the time taken by water (i) to fall from 4.5 m to 1.5 m (ii) for completely emptying of tank. Take <math>C_d = 0.62</math></li></ol>                                                                                                                                                                                                                                         | <b>07</b>                           |
| <b>Q.3</b> | <ol style="list-style-type: none"><li>(a) The weight of 5 m<sup>3</sup> of certain oil is 45 KN. Calculate its specific weight, mass density and specific gravity.</li><li>(b) Distinguish between laminar flow and turbulent flow in pipes.</li><li>(c) Derive darcy-weisbach equation for friction loss in the pipe.</li></ol>                                                                                                                                                                                                                                          | <b>03</b><br><b>04</b><br><b>07</b> |
|            | <b>OR</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                     |
| <b>Q.3</b> | <ol style="list-style-type: none"><li>(a) State Pascal's law and give some examples where this principle is applied.</li><li>(b) Discuss relative merits and demerits of venturimeter with respect to orifice meter.</li><li>(c) Derive an expression for the depth of center of pressure for inclined plane surface submerged in the liquid.</li></ol>                                                                                                                                                                                                                   | <b>03</b><br><b>04</b><br><b>07</b> |
| <b>Q.4</b> | <ol style="list-style-type: none"><li>(a) Explain surface tension.</li><li>(b) A projectile is traveling in air having pressure and temperature as 9 N/cm<sup>2</sup> and -5°C. If the mach angle is 35°, find the velocity of</li></ol>                                                                                                                                                                                                                                                                                                                                  | <b>03</b><br><b>04</b>              |

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|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
|     | projectile. Take $k=1.4$ and $R=287 \text{ J/kg}^0\text{K}$                                                                                                                                                                                                                                                             |    |
|     | (c) Explain the procedure of measuring vacuum pressure with the help of U-tube manometer.                                                                                                                                                                                                                               | 07 |
|     | OR                                                                                                                                                                                                                                                                                                                      |    |
| Q.4 | (a) An open tank contains 2 m of water covered with 1 m of oil (specific gravity 0.85). Find the pressure of the interface and the bottom of the tank.                                                                                                                                                                  | 03 |
|     | (b) What are the advantages of triangular notch over a rectangular notch?                                                                                                                                                                                                                                               | 04 |
|     | (c) A solid wooden cylinder of 3 m diameter and 2 m height floating in water with its axis vertical. Find the metacentric height of cylinder. Specific gravity of wood = 0.6                                                                                                                                            | 07 |
| Q.5 | (a) What is weir? How it different from a notch.                                                                                                                                                                                                                                                                        | 03 |
|     | (b) What are the advantages of providing mouth piece?                                                                                                                                                                                                                                                                   | 04 |
|     | (c) A 200 m long pipe is laid on a slop of 1 in 50. It has 1 m diameter at the high end and reduces to half of its diameter at lower end. Water is flowing at a rate of 60 liter/sec. If the pressure at the high end is $35.72 \text{ KN/m}^2$ . Find pressure at the low end. Neglect losses.                         | 07 |
|     | OR                                                                                                                                                                                                                                                                                                                      |    |
| Q.5 | (a) Explain term metacentre and metacentric height.                                                                                                                                                                                                                                                                     | 03 |
|     | (b) Explain characteristics of airfoil.                                                                                                                                                                                                                                                                                 | 04 |
|     | (c) Water is flowing in a rectangular channel of 1.2 m width and 0.08 m depth. Find the discharge if the crest length is 50 cm, if the head of water over the crest of weir is 18 cm and water from channel flows over weir. Take $C_d= 0.62$ . Neglect end contraction. Take velocity of approach in to consideration. | 07 |

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