# P P SAVANI UNIVERSITY

**Third Semester of Diploma Examination**

**November 2022**

**IDCV2020 Hydraulics**

**23.11.2022, Wednesday** **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

***Instructions:***

1. Make suitable assumptions and draw neat figures wherever required.
2. Use of scientific calculator is allowed.

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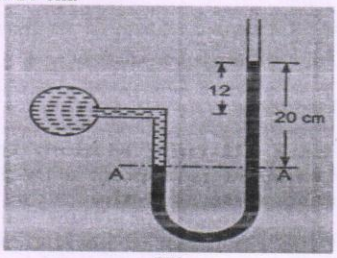
|---|---|---|---|---|
| **Q - 1** | **Attempt any five of the following.** | **[10]** | **CO** | **BTL** |
| **(i)** | Define Mass density, weight density and specific gravity with its units. | | **1** | **1** |
| **(ii)** | Write any two applications of hydraulics in Irrigation Engineering. | | **1** | **1** |
| **(iii)** | Interpret types of flow using Reynold's Number. | | **4** | **2** |
| **(iv)** | Define total pressure and centre of pressure with its unit. | | **2** | **1** |
| **(v)** | Define steady and unsteady flow with practical example. | | **3** | **1** |
| **(vi)** | Define uniform flow and non-uniform flow and give practical example for each. | | **3** | **1** |
| **Q - 2 (a)** | Explain atmospheric, gauge and vacuum pressure with the help of a neat sketch. | **[05]** | **2** | **2** |
| **Q - 2 (b)** | The right limb of a simple U – tube manometer containing mercury is open to the atmosphere, while the left limb is connected to a pipe in which a fluid of sp.gr.0.9 is flowing. The centre of pipe is 12cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe, if the difference of mercury level in the two limbs is 20 cm. | **[05]** | **2** | **3** |




**OR**

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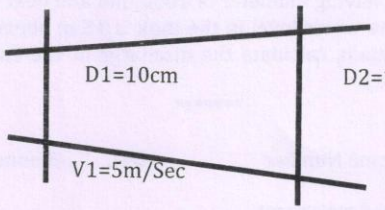
|---|---|---|---|---|
| **Q - 2 (a)** | List all the properties of fluid and derive Newton's law of viscosity | **[05]** | **1** | **1** |
| **Q - 2 (b)** | The diameter of a pipe at sections 1 and 2 are 10 cm and 15cms respectively. Find the discharge through pipe, if the velocity of water flowing through the pipe at section 1 is 5m/sec. determine the velocity at section 2. | **[05]** | **3** | **3** |

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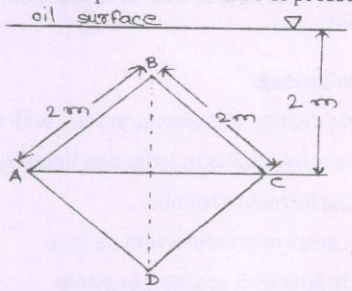
|---|---|---|---|---|
| **Q - 3 (a)** | What are major and minor loss of head in flow through Pipes? Write any two equations of minor loss. | **[05]** | **3** | **2** |
| **Q - 3 (b)** | A circular plate of 4m diameter is immersed in water such that its greatest and least depth below the free surface of water are six meters and four meters | **[05]** | **2** | **3** |

respectively. Calculate:
(i) Total pressure on one face of the plate.
(ii) The position of centre of pressure.

**OR**

| | | | | |
|---|---|---|---|---|
| **Q - 3 (a)** | A 15 cm diameter pipe suddenly enlarge to 20 cm diameter. Calculate discharge through pipe if loss of head due to sudden enlargement is 30 cm of water. | **[05]** | **3** | **3** |
| **Q - 3 (b)** | A square plate is submerged vertically in oil of specific gravity 0.9 as shown in Fig. Find the total pressure and position of centre of pressure. | **[05]** | **2** | **5** |

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|---|---|---|---|---|
| **Q - 4 (a)** | Derive condition for most economical rectangular section | **[05]** | **2** | **4** |
| **Q - 4 (b)** | Derive Bernoulli's equation. | **[05]** | **5** | **4** |

**OR**

| | | | | |
|---|---|---|---|---|
| **Q - 4 (a)** | Write down limitation of Bernoulli's equation. | **[05]** | **5** | **2** |
| **Q - 4 (b)** | Write difference between Flow through pipe and flow through channels. | **[05]** | **4** | **2** |
| **Q - 5 (a)** | Define hydraulic jump and its use. | **[05]** | **2** | **3** |
| **Q - 5 (b)** | Enlist various pressure measuring device and explain U-Tube Manometer. | **[05]** | **1** | **2** |

**OR**

| | | | | |
|---|---|---|---|---|
| **Q - 5 (a)** | Explain piezometer and its limitations. | **[05]** | **1** | **2** |
| **Q - 5 (b)** | A fluid having kinematic viscosity 21.4 stoke is flowing through a pipe of 30 cm diameter. If discharge through pipe is 15 lit/s, decide type of flow. | **[05]** | **3** | **4** |
| **Q - 6 (a)** | Write difference between natural and artificial channel. | **[05]** | **4** | **1** |
| **Q - 6 (b)** | The top and bottom diameters of a 2 m long vertical pipe are 10 cm and 5 cm respectively. Water flows down the pipe at 30 lit/sec. Find pressure difference between the two ends of the pipe. | **[05]** | **2** | **5** |

**OR**

| | | | | |
|---|---|---|---|---|
| **Q - 6 (a)** | Explain Reynold's Experiment with neat sketch. | **[05]** | **4** | **3** |
| **Q - 6 (b)** | A town is supplied with a water from overhead tank through supply main laid horizontally. First 2 km is having diameter of 1000 mm and next 2 km is having diameter of 750 mm of the water level in the tank is 15 m above the center of starting point of supply main, calculate the discharge at the end point of the supply main. (Take f = 0.01) | **[05]** | **4** | **5** |

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CO : Course Outcome Number BTL : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

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|---|---|---|
| 1: Remember | 2: Understand | 3: Apply |
| 4: Analyze | 5: Evaluate | 6: Create |