**POORNIMA UNIVERSITY, JAIPUR**

**END SEMESTER EXAMINATION, November 2022**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **2BT3102** | Roll No. | Total Printed Pages: 2 |
| **2BT3102** |  |
| B. Tech. II Year III- Semester (Main/Back) End Semester Examination, November 2022  **(CV Engg. & Dip. CV)** | |
| **BCVCCV3102 / DCVCCV3102 : Fluid Mechanics** | | | |

# Time: **3** Hours. Total Marks: **60**

Min. Passing Marks: **21**

Attempt **five** questions selecting one question from each Unit. There is internal choice from Unit I to Unit V. Marks of each question or its parts are indicated against each question / parts. Draw neat sketches wherever necessary to illustrate the answer. Assume missing data suitably (if any) and clearly indicate the same in the answer.

Use of following supporting material is permitted during examination for this subject.

# **1.--------------------------Nil--------------------** **2.------------------Nil-----------------------**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **UNIT-I (CO1)** | **Marks** | **Bloom Level** |
| **Q.1** | **(a)** | Explain different types of fluids in details? | **(6)** | **Understand** |
|  |  |  |  |  |
|  | **(b)** | A plate 0.025 mm distant from a fixed plate, moves at 60 cm/s and requires a force of 2 N per unit area i.e., 2 N/m2 to maintain this speed. Determine the fluid viscosity between the plates. | **(6)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.2** | **(a)** | Explain Capillarity. Also derive expression of capillary rise and fall. | **(8)** | **Understand** |
|  |  |  |  |  |
|  | **(b)** | What is the bulk modulus of elasticity of a liquid which is compressed in a cylinder from a volume of 0.0125 m3 at 80 N/cm2 pressure to a volume of 0.0124 m3 at 150 N/cm2 pressure. | **(4)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **UNIT-II (CO2)** |  |  |
|  |  |  |  |  |
| **Q.3** | **(a)** | Derive total pressure and centre of pressure derivation of vertical plane surface immersed in a liquid. | **(8)** | **Apply** |
|  |  |  |  |  |
|  | **(b)** | A rectangular plane surface is 2m wide and 3m deep. It lies in vertical plane in water. Determine the total pressure and centre of pressure on the plane surface when its upper edge is horizontal and   1. Coincides with water surface 2. 2.5 m below the free water surface. | **(4)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.4** | **(a)** | Derive an expression for pressure variation in a fluid at rest. | **(6)** | **Apply** |
|  |  |  |  |  |
|  | **(b)** | Derive an expression for U Tube differential manometer. | **(6)** | **Apply** |
|  |  |  |  |  |
|  |  | **UNIT-III (CO3)** |  |  |
|  |  |  |  |  |
| **Q.5** |  | Derive Euler’s equation of motion along a stream line for an ideal fluid flow stating clearly the assumption. Explain how this is integrated to get Bernoulli’s equation along a stream line. | **(12)** | **Apply** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Q.6** |  | A fluid flow field is given by  V= x2yi + y2zj – (2xyz + yz2)k  Prove that it is a case of possible steady incompressible fluid flow. Calculate the velocity and acceleration at the point (2, 1, and 3). | **(12)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **UNIT-IV (CO4)** |  |  |
|  |  |  |  |  |
| **Q.7** | **(a)** | Derive the expression for Orifice meter. | **(5)** | **Apply** |
|  |  |  |  |  |
|  | **(b)** | In a 45° bend a rectangular air duct of 1m2 cross- sectional area is gradually reduced to 0.5 m2 area. Find the magnitude and direction of the force required to hold the duct in position if the velocity of flow at the 1m2 sections is 10 m/s, and pressure is 2.943 N/cm2. Take density of air as 1.16 Kg/m3. | **(7)** | **Evaluate** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.8** | **(a)** | A 45° reducing bend is connected in a pipe line, the diameter at the inlet and outlet of the bend bring 600 mm and 300 mm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet to bend is 8.829 N/cm2 and rate of flow of water is 600 liters/s. | **(8)** | **Evaluate** |
|  |  |  |  |  |
|  | **(b)** | Derive the expression for rate of flow through venturimeter. | **(4)** | **Apply** |
|  |  |  |  |  |
|  |  | **UNIT V (CO5)** |  |  |
|  |  |  |  |  |
| **Q.9** |  | What do you mean by term:  (i) Major energy loss (ii) Minor energy loss in pipes. | **(12)** | **Understand** |
|  |  |  |  |  |
|  |  | **OR** |  |  |
|  |  |  |  |  |
| **Q.10** |  | What do you understand by total energy line, hydraulic gradient line, pipes in series, pipes in parallel and equivalent pipe? | **(12)** | **Understand** |