O.P.Code: 23CE0107 | R23 | H.T.No.

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**
(AUTONOMOUS)
**B.Tech. II Year I Semester Regular&Supplementary Examinations November-2025**
**FLUID MECHANICS**
(Civil Engineering)

**Time: 3 Hours** **Max. Marks: 70**

**PART-A**
(Answer all the Questions **10 x 2 = 20** Marks)

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | Define specific gravity. | CO1 | L1 | 2M |
| | b | Define fluid. | CO1 | L1 | 2M |
| | c | Define fluid pressure. | CO2 | L1 | 2M |
| | d | What is Centre of buoyancy? | CO2 | L1 | 2M |
| | e | Define compressible flow. | CO3 | L1 | 2M |
| | f | Define streamline. | CO3 | L1 | 2M |
| | g | Writethe Bernoulli'sequation. | CO5 | L1 | 2M |
| | h | Define vortex flow. | CO5 | L1 | 2M |
| | i | Define total energy line. | CO6 | L1 | 2M |
| | j | Define hydraulic gradientline. | CO6 | L1 | 2M |

**PART-B**
(Answer all Five Units **5 x 10 = 50** Marks)

**UNIT-I**

| | | | | | |
|---|---|---|---|---|---|
| 2 | a | Explain the phenomenon of capillarity.Obtainan expression for capillaryrise of a liquid. | CO2 | L2 | 5M |
| | b | Calculate the capillaryrise in a glass tube of 2.5mm diameter when immersed vertically in i) water & ii) mercury.Take surfacetension is 0.0725N/$m^2$ for water and 0.52 N/$m^2$ for mercuryin contact with air. The specific gravity for mercury is Givenas13.6& angleof contactis $130^0$ | CO2 | L4 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 3 | a | Explain the compressibility.Derive equation for capillary rise and fall. | CO2 | L2 | 5M |
| | b | When the pressure of liquidis increased from3.5 MN/$m^2$to6.5 MN/$m^2$ its volume is found to decrease by 0.08 percent.Calculate the bulk modulus of elasticity of the liquid? | CO2 | L2 | 5M |

**UNIT-II**

| | | | | | |
|---|---|---|---|---|---|
| 4 | a | Define Total pressure and Centre of Pressure. | CO2 | L2 | 5M |
| | b | Derive the expression forTotal Pressure of horizontal plane surface. | CO2 | L2 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 5 | a | Derive the expression forTotal Pressure of inclined plane surface. | CO2 | L2 | 5M |
| | b | Derive the expression for Center of Pressure of inclined plane surface. | CO2 | L2 | 5M |



**UNIT-III**

| | | | | | |
|---|---|---|---|---|---|
| 6 | a | Define streamline, streakline and path line,streamtube. | CO3 | L1 | 5M |
| | b | Write a brief note on continuity equation for a one-dimensional flow. | CO3 | L1 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 7 | a | Explainin detail about Velocity Potential Function and writeits properties. | CO3 | L2 | 5M |
| | b | The velocity vector in a fluidflowV=$4x^3i-10x^2yj+2tk$,Calculate the velocity And acceleration of a fluid particle at(2,1,3)attimet=1. | CO3 | L4 | 5M |

**UNIT-IV**

| | | | | | |
|---|---|---|---|---|---|
| 8 | a | The water is flowing through a pipe having diameter of 20 cm and 10 cm at section & 2 respectively.The rate of flow through pipeis 35lit/sec.The section1 is 6m above.The datum and section2 is 4m above the datum.If the pressure at the section1 is 39.24 N/$cm^2$. Calculate the intensity of pressure at the section 2. | CO5 | L4 | 6M |
| | b | An oil of Sg=0.8 is flowing through a venturimeter having inlet diameter 20cm and throat dia 10cm.the oil–Hg differential manometer shows a reading of 25cm. calculate discharge of oil through horizontal lventurimeter? Take Cd =0.98. | CO5 | L4 | 4M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 9 | | State Bernoulli's theorem for steady flow of an incompressible fluid.Derive the Expression for Bernoulli's theorem from first principle and state the assumption made for such a derivation. | CO5 | L4 | 10M |

**UNIT-V**

| | | | | | |
|---|---|---|---|---|---|
| 10 | a | Derive the expression for flow through pipes in series. | CO6 | L2 | 5M |
| | b | Derive the expression for flow through parallel pipes. | CO5 | L2 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 11 | | A main pipe divides into two parallel pipes which again forms one pipe as shown in figure. Above the length & and dia for the first parallel pipe are 2000m & 1.0m respectively. While the length & dia of 2nd parallel pipe are 2000m & 0.8m.Calculate the rate of flow in each parallel pipe if total flow in the main is 3.0 $m^3$/s.the coefficient of friction for each parallel pipe is same & equal to 0.005? | CO6 | L4 | 10M |

*** END ***