



(OR)

- |        |  |    |    |     |
|--------|--|----|----|-----|
| b)     | A liquid of density $850 \text{ kg/m}^3$ and viscosity $0.0012 \text{ Pa}\cdot\text{s}$ flows in a container. Calculate the specific weight, specific volume, and dynamic viscosity, if the vapor pressure at $30^\circ\text{C}$ is given as $3500 \text{ Pa}$ . | 13 | K1 | CO1 |
| 12. a) | i. Derive forces on curved surfaces submerged in fluids.   | 7  | K3 | CO2 |
|        | ii. Discuss the application of mechanical gauges in fluid statics.   | 6  |    |     |

(OR)

- |        |   |    |    |     |
|--------|---|----|----|-----|
| b)     | A fluid is contained in a U-tube manometer with mercury (density $13600 \text{ kg/m}^3$ ) and water (density $1000 \text{ kg/m}^3$ ). If the mercury column difference is $0.2 \text{ m}$ , calculate the pressure difference between the two points. | 13 | K3 | CO2 |
| 13. a) | Derive Darcy-Weisbach equation for head loss.   | 13 | K3 | CO3 |

(OR)

- |        |   |    |    |     |
|--------|---|----|----|-----|
| b)     | Determine the equivalent length of a pipe for a valve that causes a major equivalent loss equal to that in $25 \text{ m}$ length of straight pipe with Darcy friction factor of $0.015$ . | 13 | K3 | CO3 |
| 14. a) | Discuss types of flows and characteristics of open channels.  | 13 | K2 | CO4 |

(OR)

- |        |  |    |    |     |
|--------|--|----|----|-----|
| b)     | Using Manning's equation, calculate the discharge in a trapezoidal channel with bottom width $4 \text{ m}$ , side slopes $1:2$ , flow depth $1.5 \text{ m}$ , slope of channel $0.0010.001$ and Manning's roughness coefficient $0.03$ . | 13 | K2 | CO4 |
| 15. a) | Draw and explain the velocity triangles for centrifugal pumps.   | 13 | K2 | CO5 |

(OR)

- |    |   |    |    |     |
|----|---|----|----|-----|
| b) | Explain the working principle and efficiency factors of reciprocating pumps with neat sketch. | 13 | K2 | CO5 |
|----|---|----|----|-----|

### PART – C

(1 x 15 = 15 Marks)

- | Q.No.  | Questions   | Marks | KL | CO  |
|--------|---|-------|----|-----|
| 16. a) | Explain Buckingham's Pi theorem and derive the dimensionless groups for pipe flow involving velocity, diameter, density, viscosity and pressure drop. | 15    | K3 | CO3 |
|        | (OR)  |       |    |     |
| b)     | Analyze the performance difference between jet and submersible pumps, including their head and discharge characteristics.                             | 15    | K4 | CO5 |