JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

B.Tech-III Semester (CSE/IT/ECE/CE/BT/BI)

COURSE CODE (CREDITS):25B11CE313 (3) MAX. MARKS: 35

COURSE NAME: Fluid Mechanics

COURSE INSTRUCTORS: Ashish Kumar MAX. TIME: 2 Hour

*Note: (a) All questions are compulsory.*
*(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems*
*(c) Use of scientific calculator is allowed.*

| Q.No | Question | CO | Marks |
|---|---|---|---|
| Q1 | Differentiate between Newtonian and Non Newtonian fluid. Compute the dynamic viscosity of liquid if kinematic viscosity is 6 stokes and specific gravity is 2.0. | 1 | 3 |
| Q2 (a) | Define the term velocity potential function and stream function. | 3 | 2 |
| Q2 (b) | The velocity potential function ($\phi$) is given by an expression $\phi = -\frac{xy^3}{3} - x^2 + \frac{yx^3}{3} + y^2$ (i) Find the velocity components in x and y direction. (ii) Show that ($\phi$) represents a possible case of flow i.e. satisfies Laplace Equation. | 3 | 4 |
| Q3 (a) | Explain the term HGL and TEL in a pipe flow system | 4 | 2 |
| Q3 (b) | At a sudden enlargement of water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. estimate the rate of flow. | 4 | 5 |
| Q4 | Using the principle of dimensional analysis develop the expression for the drag force F on smooth sphere of diameter D, moving with a uniform velocity V in a fluid of density $\rho$ and dynamic viscosity $\mu$. | 5 | 6 |
| Q5 | The difference in water surface levels in two tanks, which are connected by two pipes in series of length 300 m and 200 m and of diameters 300 mm and 400 mm respectively, is 12 m. Determine the rate of flow of water if coefficient of friction is 0.005. Consider minor losses | 4 | 6 |
| Q6 (a) | Differentiate between bluffed body and stream line body. Why stream line bodies are preferred over bluffed bodies. explain with suitable example. | 6 | 3 |
| Q6 (b) | Experiments were conducted in a wind tunnel with wind speed of 15 m/s on a flat plate having the area 5 $m^2$. The density of air is 1.15 $kg/m^3$. The coefficient of drag and lift are 0.2 and 0.8 respectively. Determine (i) the lift and drag force and resultant force (ii) power exerted by air on the plate | 6 | 4 |