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**Question Paper Code : 20505**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Third Semester

Civil Engineering

CE 3301 — FLUID MECHANICS

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define buoyancy.
2. List any four properties of ideal fluids.
3. List any two devices that work on the Bernoulli's principle.
4. Mention the significance of stream function.
5. List any three limitations of dimensional analysis.
6. Write any four advantages of model analysis.
7. What is known as total energy line? Write its equation.
8. What is an equivalent pipe?
9. Why does a boundary layer become turbulent?
10. State the lift force value for symmetrical subjects placed in ideal fluid.

PART B — (5 × 13 = 65 marks)

11. (a) (i) What is a fluid? Explain the properties of fluids in detail. (8)  
(ii) Explain different types of equilibrium of floating bodies. (5)

Or

- (b) What is called hydrostatic force? Explain the forces on vertical and horizontal plane surfaces. (13)

12. (a) List out and explain the classification of flows in a fluid. (13)

Or

(b) (i) Derive the Euler's equation of motion. (9)

(ii) What are assumption made in the Bernoulli's equation? (4)

13. (a) Write short notes on

(i) Geometric similarity. (4)

(ii) Kinematic similarity. (4)

(iii) Dynamic similarity. (5)

Or

(b) (i) What are distorted models? State its merits and demerits. (5)

(ii) Write the advantages of model and dimensional analysis. (4)

(iii) List the primary and derived quantities. (4)

14. (a) (i) A pipe, 40 m long, is connected to a water tank at one end and flows freely in atmosphere at the other end. The diameter of pipe is 15 cm for first 25 m from the tank, and then the diameter is suddenly enlarged to 30 cm. Height of water in the tank is 8 m above the center of pipe. Darcy's coefficient is 0.01. Determine the discharge, neglecting minor losses? (6)

(ii) Two reservoirs are connected by two parallel pipes. Their diameter are 300 mm and 350 mm and lengths are 3.15 km and 3.5 km respectively. The respective values of coefficient of friction are 0.0216 and 0.0325. What will be the discharge from the larger pipe, if the smaller one carries 285 lps? (7)

Or

(b) (i) Explain the Moody's chart. (7)

(ii) What is siphon? Write its purpose of function. (6)

15. (a) Explain the boundary layer thickness and its types. (13)

Or

(b) (i) Discuss the drag and lift forces in detail. (8)

(ii) Explain the separation of boundary layer. (5)

PART C — (1 × 15 = 15 marks)

16. (a) (i) What is continuum hypothesis and how it is used? (4)  
(ii) What is Velocity Potential function? Derive its equation. (6)  
(iii) Mention the limitations of using Bernoulli's theorem. (5)

Or

- (b) (i) Write short notes on Reynold's number. (5)  
(ii) What are minor losses? Explain in detail the types minor losses of flow in pipes. (10)