(NO. OF PAGES: 2)

(FOR THE CANDIDATES ADMITTED **24PMS415**

DURING THE ACADEMIC YEAR 2024-2025 ONLY) REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS :MAY 2026

MSc.- MATHEMATICS **MAXIMUM MARKS: 75**

SEMESTER : IV **TIME : 3 HOURS**

24PMS415 – FLUID DYNAMICS

SECTION – A (10 X 1 = 10MARKS)

ANSWER THE FOLLOWING QUESTIONS. (K1)

1. Streak lines are obtained experimentally by ___.

a) Pitot tube b) Hot wire c) Dye injection d) Pressure gauge

2.Velocity potential exists only for ___.

a) rotational flow b) turbulent flow c) irrotational flow d) viscous flow

3. Equipotential lines are always ____.

a) parallel to stream lines b) perpendicular to stream lines

c) coincident with streamlines d) curved randomly

4. Pressure drag is dominant in _____.

a) streamlined bodies b) flat plates c) Bluff bodies d) thin wires

5. Viscosity arises due to ___.

a) pressure difference b) gravity c) molecular cohesion d) surface tension

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES (K2)

6. Define vorticity.

7.What is circulation?

8.What is axillary symmetric flow?

9. What is Rankine body?

10. Define boundary layer.

SECTION – B (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.(K3)

11. a) Define streamline, pathline and streak line.

(OR)

b) Explain: (i) Viscous incompressible fluid (ii) Nonviscous fluid.

12. a) Derive Euler's equation of motion along a streamline.

(OR)

b) Calculate the circulation I' of a circulatory flow ($v_r = v_z = 0$) with constant vorticity ($\Omega_z = const.$) from both the circulation concept and stoke's theorem.

13. a)Derive Laplace equation for velocity potential.

(OR)

b) Explain stream function in three-dimensional flow.

14. a) Explain Rankine's method of constructing streamlines.

(OR)

b)What is Magnus effect? Explain.

15. a) Define Reynolds number and explain its significance.

(OR)

b) Explain flow between two coaxial cylinders.

SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K4 (Or) K5)

16. a) Derive Navier-Stokes equations.

(OR)

b) Explain Lagrengian and Eulerian methods of describing fluid motion.

17. a) Derive Bernoulli's equation from Euler's equation.

(OR)

b) Explain momentum theorem with its applications.

18. a) Define expressions for velocity in source and sink flows.

(OR)

b) Explain flow net construction and engineering applications.

19. a)Derive expression for drag coefficient.

(OR)

b) Explain three-dimensional motion-sphere in a uniform stream.

20. a) Explain flow between parallel flat plates.

(OR)

b) Derive expression for laminar boundary layer thickness over a flat plate.

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