



Regulation R18  
TKR COLLEGE OF ENGINEERING AND TECHNOLOGY  
(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code: 2P3AD

**B.Tech III Semester Supplementary Examinations, March/April 2023**

**\* FLUID MECHANICS**  
(CIVIL ENGINEERING)

**Maximum Marks: 70**

Date: 04.04.2023 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Total 10 questions it consists.
  4. Part-B each question carries 10 marks and may have a, b, c, d as sub questions.

**Part-A**

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 Define absolute and gauge pressure
- 2 A soap bubble 50 mm diameter has inside pressure of 20 N/m<sup>3</sup> above atmosphere. Calculate the surface tension in soap film?
- 3 State the stability criteria for a submerged body in unstable and neutral equilibrium positions.
- 4 Distinguish between uniform and non-uniform flow
- 5 List out the forces that are considered in Euler's equation
- 6 How does a pitot tube works.
- 7 Define velocity of approach
- 8 What is Darcy's equation?
- 9 Define boundary layer.
- 10 What do you mean by drag and lift?

**Part-B**

Answer All the following questions.

(5X10M=50Marks)

- 11 State Newton's law of viscosity and give its application with Newtonian and Non-Newtonian fluids. [10]
- 12 An isosceles triangle of 4 m base and 6 m height is located vertically in the water whose height is parallel to free surface of water and its vertical height from free surface of water is 8 m. determine the pressure force acting on it and location of centre of pressure both vertically and laterally. [10]
- 13 Determine whether the following velocity components satisfy the continuity equation. i)  $u = cx, v = -cy$  ii)  $u = -cx/y, v = c \log xy$ . [10]
- 14 Distinguish between: (i) Steady flow and un-steady flow, (ii) Uniform and nonuniform flow. [5+5]
- 15 Explain the principle of venturimeter. Also derive the expression for rate of flow using a venturimeter when there is a flow through a pipe line. [10]

OR

- 16 Derive an expression for the Bernoulli's equation. [10]
- 17 Find the head lost due to friction in a pipe of diameter 300 mm and length 50 m, through which water is flowing at a velocity of 3 m/s using (i) Darcy formula, (ii) Chezy's formula for which  $C = 60$ . [10]

OR

- 18 Explain with neat sketch the Reynold's experiment and define Laminar and Turbulent flow. [10]
- 19 Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by  $u/U = 2(y/\delta) - (y/\delta)^2$ . [10]

OR

- 20 a) Draw a diagram for drag force on a plate due to boundary layer.  
b) Write down any one boundary conditions for the velocity profiles. [5+5]