R18 Regulation *Subject code:* 2P3AD

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech III Semester Regular Examinations, NOV/DEC 2019

FLUID MECHANICS

(Civil Engineering)

Maximum Marks: 70 Date: 03.12.2019 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. Answer any one full question from each unit which carries 10M.
4. 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 atmospheric, absolute gauge and vacuum pressures.
2 Define surface tension, viscosity of the fluid.
3 Define path line and stream line.
4 Explain the laws of fluid friction for Laminar flow.
5 Define rotational and irrotational flows.
6 List out the advantages of Triangular notch over Rectangular notch.
7 Explain Water hammer pressure in pipes.
8 A 30 cm pipe carries water at a velocity of 24.4 m /sec. At points A and B measurements of pressure and elevation were respectively 3.68 kg/cm^2, 2.94 kg/cm^2, 30.5 m and 33.5m for a steady flow. Find the loss of head between A and B.
9 Explain the characteristics of Laminar flow and Turbulent flow.
10 Define Magnus effect.

Part-B

Answer All the following questions. **(10MX 5=50Marks)**

11 A. Derive Hydrostatic Law. (7M)
B. At a certain point in castor oil the shear stress is 0.216 N/ m^2 and velocity gradient is 0.216/sec. If the mass density of castor oil is 959.42 kg/ m^3, find the kinematic viscosity of the oil. (3M)

OR

12 A. Derive Pascal's Law.(5M)
B. Classify different simple Manometers with neat sketches.(5M)

13 A. Develop an equation for determination of metacentric height for floating bodies. (5M)
B. Derive continuity equation in three dimensional flow. (5M)

OR

14 A. Define steady, Unsteady, Uniform, Non uniform flows. (4M)
B. Derive an equation for discharge through a Rectangular notch. (6M)

OR

15 A. Derive Momentum equation for a flow in a pipe. (5M)

B. Explain the classifications of different Notches. (5M)

OR

16 A. State the assumptions and derive Bernoulli's equation for flow along a stream line. (5M)

B. A Venturimeter having a diameter of 7.5 cm at the throat and 15 cm diameter at the enlarged end is installed in a horizontal pipe line 15cm in diameter carrying an oil of specific gravity 0.9.The difference of pressure head between the enlarged end and the throat recorded by a U- tube manometer is 17.5cm of mercury. Determine the discharge through the pipe. Assume the coefficient of discharge of the Venturimeter C_d is 0.97. (5M)

17 A. Develop Darcy's equation for a Turbulent flow through pipes. (7M)

B. List out Minor losses in a pipe. (3M)

OR

18 A. A crude oil of kinematic viscosity 0.4 stokes is flowing through a pipe of diameter 300 mm at the rate of 300 lit/ sec. Find the head lost due to friction for a length of 50 m of the pipe. (5M)

B. Compare the flow of fluid through pipes when connected in series and in parallel. (5M)

19 A. Air flows over a flat plate 1m long at a velocity of 6 m/ sec. Find i) The boundary layer thickness at the end of the plate,ii) Shear stress at the middle of the plate and Total drag per unit length on the side of the plate. Take ρ_{air} = 1.24kg/ m^3 Kinematic viscosity of air is 0.15stokes. (5M)

B. Explain the characteristics of boundary layer along a thin flat plate. (5M)

OR

20 A. Explain turbulent boundary layer. (3M)

B. Explain boundary layer separation. (7M)