R18 Regulation *Subject code:* 2P4CB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, July 2021

FLUID MECHANICS AND HYDRAULIC MACHINES
(MECHANICAL ENGINEERING)

Maximum Marks: 70 Date:15.07.2021Duration: 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 What is the difference between dynamic viscosity and kinematic viscosity
2 Define capillarity and surface tension.
3 Differentiate between stream function and velocity potential
4 Write the difference between steady flow and uniform flow
5 What is boundary layer separation?
6 Name some dimensionless numbers.
7 Write an expression for force exerted by jet on stationary vertical plate?
8 Differentiate between radial flow and tangential flow in turbines
9 What is specific speed of a pump? Give the equation for it.
10 What are the velocity of whirl and velocity of flow?

Part-B

Answer All the following questions. (5X10M=50Marks)

11 a) Differentiate between U-tube and Differential Manometer With a neat sketch.(6M)
b)Differentiate between: (i) Liquids and gases, (ii) Real fluid and ideal fluids. (4M)

OR

12 a) Calculate the shear stress developed in oil of viscosity 1.4 poise, used for lubricating the clearance between a shaft of diameter 15 cm and its journal bearing. The shaft rotates at 175 rpm and clearance is 1.5 mm. (8M)
b) What is Pascal's law? Explain with one example. (2M)

13 a) Derive the equation of continuity in differential form (5M)
b) State the momentum equation and mention some of its engineering applications. (5M)

OR

14 a) Define path line, streak line and the stream line. For what type of flow these lines are identical. (5M)
b) Describe the types of fluid flows. (5M)

15 a) What are the methods to be taken for the control of separation of boundary layer. (6M)
b) What is a boundary layer? Why does it increase with distance from the upstream edge? (4M)

OR

16 a) Derive an expression for head loss due to friction. (5M)
b) Define minor losses in pipes and obtain equation for any four losses. (5M)

17 a) Obtain an expression for the force exerted by a jet of water on a fixed vertical plate in the direction of the jet.(5M)
b) A jet of water of diameter 60 mm moving with a velocity of 25 m/s strikes a fixed plate in such a way that the angle between the jet and the plate is 55°. Find the force exerted by the jet on the plate (i) in the direction normal to the plate, and (ii) in the direction of the jet.(5M)

OR

18 a) What type of turbine is Kaplan turbine? Explain how it works with a neat diagram. Discuss the importance of draft tube in reaction turbines. (5M)
b) How are turbines classified? Explain the working of Pelton wheel turbine with a neat sketch. (5M)

19 a) A single – acting reciprocating pump running at 50rpm, delivers 0.01m3/s of water. The diameter of the piston is 200mm and stroke length 400mm. Determine the theoretical discharge of the pump and co-efficient of discharge, slip and the percentage slip of the pump. (8M)
b) Differentiate between reciprocating pump and centrifugal pump. (2M)

OR

20 a) List out necessary precautions against cavitation in centrifugal pumps. (5M)
b) Explain the working of reciprocating pump with neat sketch. (5M)