Regulation 18 *Subject code: 2P4CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, July 2022

FLUID MECHANICS AND HYDRAULIC MACHINES

(Mechanical Engineering)

Maximum Marks: 70 Date:22.07.2022 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.
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 Viscosity and Surface tension.
2 Define Vapour Pressure and specific gravity.
3 Classify different types of fluid flows.
4 Explain Bernoulli's equation briefly.
5 What do you understand the term boundary layer and boundary layer theory?
6 Explain Darcy Weisbach equation briefly?
7 Classify different types of turbines?
8 Mention the difference between impulse turbine and reaction turbine.
9 Mention the difference between pump and turbine.
10 Explain NPSH briefly?

Part-B

Answer All the following questions. (10M X 5=50Marks)

11 a) Explain the difference between dynamic viscosity and kinematic viscosity? State their unit of measurement. 5
b) What are the devices used for measurement of pressure? 5

OR

12 The right limb of a simple U- tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of sp.gr. 0.9 is flowing. The centre of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20 cm. 10

13 Explain (i) Stream line (ii) path line (iii) Irrotational Flow (iv) Streak line. 10

OR

14 The water is flowing through a taper pipe of length 100m having diameters 600mm at the upper end and 300mm at the lower end, at the rate of 50 litres/s. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher level is 19.62 N/cm^2. 10

15 Explain (i) Laminar Boundary layer (ii) Turbulent Boundary layer (iii) Boundary layer thickness (iv) Drag and (v) Lift 10

OR

16 Explain Minor energy(head) losses in pipes. 10

17 A 7.5 cm diameter jet having a velocity of 30 m/s strikes a flat plate, the normal of which is inclined at 45^0 to the axis of the jet. Find the normal pressure on the plate: 10
(i) when the plate is stationary, and
(ii) When the plate is moving with a velocity of 15 m/s and away from the jet.
Also determine the power and efficiency of the jet when the plate is moving.

OR

18 A Pelton wheel is to be designed for the following specifications: 10
Shaft power =11,772 kw; Head = 380 metres; Speed = 750 r.p.m; Overall efficiency = 86%; Jet diameter is not to exceed one-sixth of the wheel diameter. Determine :
(i) The wheel diameter, (ii) The number of jets required, and (iii) Diameter of the jet.
Take $K_{v1} = 0.985$ and $K_{u1} = 0.45$.

19 Write the working principle of centrifugal pump. What are the main parts of centrifugal pump? 10

OR

20 Write the working principle of Reciprocating pump. What are the main parts of Reciprocating pump? 10