Regulation: R18 *Subject Code:2P4AC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, July 2022

HYDRAULICS & HYDRAULICS MACHINES

Civil Engineering

Maximum Marks: 70 **Date:26.07.2022 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 10 questions. Answer any 5 questions which carries 10M.
4. Each question carries 10marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M = 20 Marks)

1. Write about Specific energy?
2. What is energy dissipation?
3. What is model and write with an example?
4. Write the different types of dimensionless numbers?
5. State the principle of Angular momentum.
6. Define Hydraulic efficiency and Mechanical efficiency.
7. What is draft tube?
8. Define Cavitation.
9. Write about Governing of turbines.
10. What are the classifications of Hydropower plants?

Part-B

Answer all the questions. (5x10M = 50Marks)

11. An open channel of trapezoidal section, 2.5 m at the base and having sides inclined at 60^0 to the horizontal, has a bed slope of 1 in 500. It is found that when the flow is 1.5 m^3/s the depth of water in the channel is 0.5 m. Assuming the validity of the Manning's formula., calculate the flow when the depth is 0.7 m. [10M]

OR

12. Illustrate the differences between flow through pipes and flow through channels Compare and contrast Rapidly varied flow and gradually varied flow. [10M]

13. State and explain Buckingham's pi theorem. Give one example. [10M]

OR

14. The Resisting force R of a supersonic plane during flight can be considered as dependent upon the length of the aircraft l, velocity V, air viscosity μ, air density ρ and bulk modulus of air K. Express the functional relationship between these variables and resisting force. [10M]

15. A Pelton wheel has a mean bucket speed of l0 meters per second with a jet of water flowing at the rate of 700 liters/s under a head of 30 meters. The buckets deflect the jet through an angle of 160^0. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.9. [10M]

OR

16. Derive the expression for force exerted by a jet on stationary inclined flat plate and vertical plate. [10M]

17. Define the term unit power, unit speed and unit discharge with reference to a hydraulic turbine. And also derive the expression for these terms. [10M]

OR

18. An impulse turbine of 2.75 m diameter is rotated at 11000kW at 300 r.p.m under a head of 490 m. It uses 2.7 m^3/sec discharge if the turbine is operated under a head of 400 m. (a) What will be the speed, power and discharge. (b) Determine the size of the wheel to develop 7000kW power under a head of 300 m. Also determine the speed and discharge. [10M]

19. Define a centrifugal pump. Explain the working of a single -stage centrifugal pump with sketches. [10M]

OR

20. Define the specific speed of the turbine and also derive the expression for the specific speed of the centrifugal pump. [10M]