



R17 Regulation

Subject code: 1P4AB

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Year II Semester Supplementary Examinations, July 2021

FLUID MECHANICS-II

Civil Engineering

Maximum Marks: 70

Date:19.07.2021 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 List the types of flow in open channel.
- 2 Explain chezy's and manning's formula for uniform flow.
- 3 Define for Buckingham's π theory dimensional analysis.
- 4 What do you mean by geometric, kinematic and dynamic similarities?
- 5 Write the applications of radial flow turbines
- 6 Define the angular momentum principle.
- 7 Define gross head and net head.
- 8 How will you classify the turbines?
- 9 Define priming.
- 10 Define NPSH

Part-B

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

- 11 a) What is critical depth? With usual notations prove that in case of a rectangular Channel $y_c = (q^2/g)^{1/3}$. (5M)
b) Determine the first principle and the conditions required for the jump in case of the rectangular channel of the constant width and the loss of the energy? (5M)

OR

- 12 a) Define hydraulic jump. Explain various types of hydraulic jump. Derive the head loss in hydraulic jump. (5M)
b) A 5m wide rectangular channel conveys $18\text{m}^3/\text{sec}$ of the water at the depth of 1.5m, Calculate a) Specific energy and b) Critical depth. (5M)

- 13 A fluid density ' ρ ' and viscosity ' μ ' flows at an average velocity ' v ' through a circular pipe of diameter ' D '. Show by dimensional analysis that the shear stress at the pipe is given by $\tau_0 = \rho v^2 \phi [\rho v D \mu]$. (10M)

OR

- 14 a) Define the following non-dimensional numbers: Reynolds number, Froude's number and Mach's number. What is their significance for fluid flow problems? (5M)
- b) The variables controlling the motion of a floating vessel through water are the drag force F , the speed V , the length L , the density ρ and dynamic viscosity μ of water and acceleration due to gravity g . Derive an expression for F by dimensional analysis. (5M)
- 15 A jet of dia 60mm moving with velocity of 20m/sec and the jet strikes an inclined plate with angle of 20°
- i) Calculate all the forces, if the plate is stationary
- ii) Calculate work done per second, power in(kw), efficiency, if the plate is moving with the velocity of 10m/sec. (10M)

OR

- 16 a) A jet of dia 30mm is moving with the velocity of 50 m/sec and strikes at an angle of 20° with the fixed plate. Calculate all the forces exerted by the jet on the plate. (5M)
- b) Explain about radial flow turbines? (5M)
- 17 A penstock supplying the water from reservoir to turbine with gross head of 60 m. Calculate the power delivered by the water to the runner and hydraulic efficiency, if the penstock subjecting the water is 2m/second. Consider coefficient of velocity 0.98 and bucket velocity is 0.54 times of jet velocity, angle of deflection 160° . consider no friction losses in the penstock. (10M)

OR

- 18 a) Derive Specific speed of turbines? (5M)
- b) What are the characteristics curves of a hydraulic turbine? How are they useful to a practical engineer? (5M)
- 19 a) Explain about working of centrifugal pump with neat sketch. (5M)
- b) The diameter of an impeller of a centrifugal pump at inlet and outlet are 300 mm and 600 mm respectively. The velocity of flow at outlet is 2.5 m/sec and vanes are set back at an angle of 45 degrees at outlet. Determine the minimum starting speed of the pump if the manometer efficiency is 75%. (5M)

OR

- 20 a) What are the various applications of Hydroelectric power plant. (5M)
- b) Define cavitation. What are the effects of cavitation? Give the necessary precaution against the cavitation. (5M)