Code No: 134BA **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech II Year II Semester Examinations, February - 2024
FLUID MECHANICS - II
(Civil Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A
(25 Marks)

1.a)	Write any four applications of Hydraulic Jump.	[2]
b)	What is critical depth in open channel flow? Can open channel flow be laminar?	[3]
c)	Define and explain the term similitude.	[2]
d)	State and explain the significance of Buckingham's pi theorem.	[3]
e)	Define Impulse Momentum Principle.	[2]
f)	Derive an expression for Force exerted by a jet on a stationary curved plate.	[3]
g)	Define the term impact of jet.	[2]
h)	Find the force exerted by a jet of water of diameter 70 mm on a stationary flat plate, normally with a velocity of 25m/s.	[3]
i)	Define the terms, Slip and Negative slip in pumps.	[2]
j)	Why pumps are generally less efficient than turbines.	[3]

PART - B
(50 Marks)

2.a) Explain velocity distribution in open channel flow.
b) Discuss about types of Channels. [5+5]

OR

3.a) What is Chezy's formula for determining the velocity of an open channel flow?
b) An irrigation channel of trapezoidal section, having side slope 3 horizontal to 2 vertical, is to carry a flow of 10 cumecs on a longitudinal slope of 1 in 5000. The channel is to be lined for which the value of friction coefficient in Manning's formula is n = 0.012. Find the most economical section of channel. [5+5]

4.a) Explain Rayleigh's method for Dimensional analysis.
b) 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 is k. Express the functional relationship between the variables and the resisting force. [3+7]

OR

5. Explain the following in fluid flow:
a) Reynolds Number
b) Euler's Number
c) Mach 's Number
d) Weber's Number [3+3+2+2]

6. Derive an expression for force exerted by the jet of water on moving curved plate. [10]

OR

7. A jet of water of diameter 100 mm strikes a curved plate at its centre with a velocity of 15 m/sec. The curved plate is moving with a velocity of 7 m/sec in the direction of the jet. The jet is deflected through an angle of 1500. Assuming the plate is smooth find
a) force exerted on the plate in the direction of the jet
b) power of the jet
c) efficiency [4+3+3]

8. A Pelton wheel has a mean bucket speed of 10 m/sec with jet of water flowing at the rate of 700 L /s under a head of 30 meters. The buckets deflects the jet trough 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 0.98 [10]

OR

9. Differentiate between
a) Impulse and Reaction turbine
b) Radial and Axial flow Turbines
c) Inward and Outward Radial flow turbines [3+3+4]

10. Explain the multistage pumps with impellers in series and parallel. [10]

OR

11. A centrifugal pump is to discharge 0.118 m^3 / sec at a speed of 1450 rpm against a head of 25 m. The impeller diameter at outlet is 250 mm and its width at outlet is 50 mm and mano metric efficiency is 75 %. Determine vane angle at outer periphery of the impeller [10]

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