Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Third Semester – Regular & Supplementary) Examinations, November 2025

23BBTPE23011-Fluid Mechanics and Hydraulic Machines

(Biotechnology)

Time: 3 hrs Maximum: 60 Marks

Answer ALL questions

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions		CO #	Blooms Level
a.	Explain the concept of surface tension.	CO1	K2
b.	What is centre of pressure?	CO2	K1
c.	Define continuity equation?	CO3	K1
d.	Give a brief note on Pitot tube.	CO4	K2
e.	Differentiate between Inward and Outward Radial flow turbines.	CO5	K4

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions		Marks	CO #	Blooms Level
2. a.	Calculate the capillary rise in a glass tube of 3mm diameter when immersed in water at 20^0C. Take surface tension of water at 20^0C as 0.0075 kg/m. What will be the percentage increase in the value of capillary rise if the diameter of the glass tube is 2 mm?	5	CO1	K3
b.	A body of weight 500N having surface area of 0.2 m^2 slides down a lubricated inclined plane making an angle 300 with the horizontal. The oil has viscosity of 10 poise and a body speed of 1 m/s, determine the film thickness of the oil required	5	CO1	K2
	(OR)			
c.	A U-tube manometer is connected to a pipe containing oil (specific gravity = 0.85). The other limb is open to the atmosphere. The manometric fluid is mercury (specific gravity = 13.6). If the mercury column shows a difference of 200 mm, determine the gauge pressure of the oil in the pipe.	5	CO1	K3
d.	What are differential manometers? Explain the types of differential manometers.	5	CO1	K2
3.a.	A vertical rectangular gate 2 m wide and 3 m high is submerged in water such that the top edge is 1 m below the water surface. Calculate the total hydrostatic force acting on the gate and the position of the centre of pressure.	5	CO2	K3
b.	Explain the term total pressure acting on a plane surface immersed in a fluid at any angle. Obtain an expression for this, and also for the corresponding depth of the centre of pressure	5	CO2	K3
	(OR)			
c.	Compare stability of submerged and floating bodies	5	CO2	K3
d.	Find the metacentric height of a floating body experimentally, given the angle of tilt and restoring moment.	5	CO2	K2
4.a.	Discuss the limitations and characteristics of flow net	5	CO3	K3

b.	A Venturi meter of throat diameter 5 cm is fitted into a 12.5 cm diameter water pipe line. The coefficient of discharge is 0.96. Calculate the flow in the pipe line when the reading on a mercury water differential U tube manometer connected to the upstream and throat sections shows a reading of 20 cm.	5	CO3	K4
	(OR)			
c.	State and derive Bernoulli's theorem, mentioning clearly the assumptions underlying it?	5	CO3	K3
d.	Explain about Reynolds experiment with neat sketch?	5	CO3	K2
5.a.	Explain how the following flow problems are analyzed. i) Series pipe connection (ii) parallel pipe connection iii) Equivalent pipe connection.	5	CO4	K3
b.	A pipe of diameter 400 mm carries water at a velocity of 25 m/s. the pressures at the points A and B are given as 29.43 N/cm^2 and 22.563 N/cm^2 respectively while the datum head at A and B are 28 m and 30 m. Find the loss of head between A and B	5	CO4	K4
	(OR)			
c.	What are the various coefficients of an Orifice? Explain it?	5	CO4	K3
d.	The rate of flow of water through a horizontal pipe is $0.3m^3$/sec. The diameter of the pipe is suddenly enlarged from 25cm to 50cm. The pressure intensity in the smaller pipe is $1.4Kgf/cm^2$. Determine loss of head due to sudden enlargement, pressure intensity in the large pipe and power lost due to enlargement.	5	CO4	K2
6.a.	What is the importance of a draft tube in a Francis turbine? Discuss different types of draft tubes.	5	CO5	K3
b.	Define i. Theoretical discharge ii. Actual discharge iii. Slip and iv. Coefficient of discharge of reciprocating pump	5	CO5	K4
	(OR)			
c.	Explain the working of reciprocating pump with neat sketch.	5	CO5	K2
d.	Explain various types of impellers used in centrifugal pump.	5	CO5	K2

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