QP Code: RM22BTECH143 | Reg. No | | | | | | | | | | | AY 22

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester Regular) Examinations, May – 2024

22BBTES24001 - Fluid Mechanics & Hydraulic Machines

(Biotechnology)

Time: 3 hrs | Maximum: 70 Marks

(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.	Calculate the specific weight, density and specific gravity of 2 litre of a liquid which weighs 15 N.	CO2	K3
b.	A plate of 0.0254mm distant from a fixed plate moves at 61cm/sec and requires a force of 0.2 kgf/m^2 to maintain the speed. Determine the dynamic viscosity of the fluid between plates	CO3	K3
c.	What is Vena –Contracta? How C_c, C_d & C_v are related?	CO2	K2
d.	What are the design parameters of a Pelton Wheel?	CO1	K1
e.	Define degree of reaction of an Inward Radial Flow Turbine.	CO1	K2

PART – B **(15 x 4 = 60 Marks)**

	Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a.	Explain the rheological classification of fluids with the required graphs.	5	CO3	K2
b.	Calculate the capillary rise in a glass tube of 2.5 mm diameter when immersed vertically in (a) water and (b) mercury. Take surface tensions σ = 0.0725 N/m for water and σ = 0.52 N/m for mercury in contact with air. The specific gravity of mercury is given as 13.6 and angle of contact is 130^0.	10	CO2	K3
	(OR)			
c.	Derive the expression for the total pressure and centre of pressure of a vertical plane surface submerged in liquid	7	CO3	K4
d.	A solid cylinder of diameter 3 m has a height of 2 m. Find the meta-centric height of the cylinder when it is floating in water with its axis vertical. The specific gravity of cylinder is 0.7.	8	CO2	K3
3.a.	Write short notes on a. Steady and Unsteady flow b. Uniform and Non- Uniform flow c. Rotational and Irrotational flow d. Laminar flow and Turbulent flow	8	CO1	K2
b.	An open tank contains water upto a depth of 2 m and above it an oil of specific gravity 0.9 for a depth of 1 m. Find the pressure intensity (i) At the interface of the two liquids and (ii) At the bottom of the tank.	7	CO2	K3
	(OR)			

c.	The velocity potential function is given by $$\phi = -\frac{xy^3}{3} - x^2 + \frac{x^3y}{3} + y^2$$ (i) Find the velocity components in x and y direction. (ii) Show that ϕ represents a possible case of flow.	7	CO2	K3
d.	A pipe line carrying oil of specific gravity of 0.87, changes in diameter from 200 mm diameter at a position A to 500 mm diameter at a position B which is 4m at a higher level. If the pressures at A and B are 9.81 N/cm^2 and 5.866 N/cm^2 respectively and the discharge is 200 lit/s, determine the loss of head and direction of flow	8	CO2	K3
4.a.	. A jet of water of diameter 7.5 cm strikes a curved plate at its centre with a velocity of 20 m/s. The curved plate is moving with a velocity of 8 m/s in the direction of the jet. The jet is deflected through an angle of 165^0. Assuming the plate smooth find: (i) Force exerted on the plate in direction of jet (ii) Power of the jet (iii) Efficiency of the jet	7	CO3	K3
b.	(iv) Derive the expression for force exerted by a jet on movable inclined plate	8	CO2	K4
	(OR)			
c.	Describe briefly about the hydro-electric power plant, drawing a neat layout of it. Also explain the different efficiencies connecting to it.	8	CO3	K2
d.	Do the classification of hydraulic turbines and describe briefly.	7	CO1	K2
5.a.	Derive the expression for discharge through and work done by Reciprocating pump. Also define the slip of Reciprocating pump with mathematical expression.	10	CO3	K3
b.	Write the classification of reciprocating pump.	5	CO1	K2
	(OR)			
c.	Explain with neat diagram the working of a reciprocating pump.	5	CO3	K3
d.	Explain with neat diagram the working of a single stage centrifugal pump.	10	CO3	K2

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