Vivekananda College of Engineering & Technology, Puttur [A Unit of Vivekananda Vidyavardhaka Sangha Puttur ®] Affiliated to VTU, Belagavi & Approved by AICTE New Delhi			
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CONTINUOUS INTERNAL EVALUATION - 2

Dept:CV	Sem / Div: 4	Sub:Applied Hydraulics	S Code: 18CV43
Date: 04/08/22	Time:9.30-11.0am	Max Marks: 50	Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

QN		Questions	Marks	RBT	CO's
		PART A			
1	a	Explain Dimensionally homogeneous equation. Give any two examples	7	L2	CO1
	b	What are the types of similarities to be established for complete similarity to exist between the model and its prototype.	8	L2	CO1
	c	In the model test of a spillway the discharge and velocity of flow over the model were $2m^3/s$ and 1.53m/s respectively. Calculate the velocity and discharge over the prototype which is 36 times the model size.	10	L3	CO1
		OR			
2	a	State and prove the Buckingham π theorem. Also explain its advantages over Rayleigh's method of dimensional analysis.	10	L2	CO1
	b	A ship 300m long moves in sea-water, whose density is 1030 kg/m^3. A 1:100 model of this ship is to be tested in a wind tunnel. The velocity of air in the wind tunnel around the model is 30 m/s and the ressstance of the model is 60N. Determine the velocity of ship in sea-water and also the resistance of the ship in sea water. The density of air is given as 1.24 kg/m^3. Take the kinematic viscosity of sea water and air as 0.012 strokes and 0.018 strokes respectively.	7	L3	CO1

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	c	Derive on the basis of dimensional analysis suitable parameters to present the thrust developed by a propeller. Assume that the thrust P depends upon the angular velocity W, speed of advance V, diameter D, dynamic viscosity μ, -mass density ∫, elasticity of the fluid medium which can be denoted by the speed of sound medium C .	8	L3	CO1
		PART B			
3	a	A jet of water of diameter 75mm strikes a curved vane at its center with a velocity of 25m/s. The curved vane is moving with a velocity of 10m/s in the direction of jet. The jet is deflected through an angle of 165°. Assume the plate is smooth. Find i) Force exerted on the plate in the direction of jet	10	L3	CO4
	b	A jet of water strikes an unsymmetrical moving curved vane tangential at one of the tips. Derive an expression for the force exerted by the jet in the horizontal direction of motion of vane. Also describe the velocity and obtain the expression for work done per second	8	L2	CO4
	c	A jet of water of diameter 45mm moving with a velocity of 35m/s, strikes a curved stationary symmetrical plate at the centre. Find the force exerted by the jet of water in the direction of the jet, if the jet is deflected through an angle of 120^0 at the outlet of the curved plate.	7	L3	CO4
		OR			
4	a	A jet of water strikes an unsymmetrical fixed curved vane tangential at one of the tips. Derive an expression for the force exerted by the jet in the horizontal direction of motion of vane.	8	L2	CO4
	b	A jet of water moving at 12m/s impinges on vane shaped to deflect the jet through 130^0 when stationary. If the vane is moving at 6 m/s, find the angle of the jet, so that there is no shock at inlet, what is the absolute velocity of the jet at exit in magnitude and direction and work done per second per unit weight of water striking per second? Assume the vane is smooth.	10	L3	CO4
	c	A jet of water of diameter 45mm moving with a velocity of 35m/s, strikes a curved stationary plate at one end tangentially at an angle 32^0 to the horizontal and leaves at an angle 25^0 to the horizontal. Find the force exerted by the jet of water on the plate in the horizontal and vertical direction .	7	L3	CO4

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