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Paper Code: U359 - 111 (ESE)

DECEMBER 2019/ENDSEM**T. Y. B. TECH. (CIVIL) (SEMESTER - I)****COURSE NAME: FLUID MECHANICS II****COURSE CODE: CVUA31171****(PATTERN 2017)**

Time: [2 Hours]

[Max. Marks: 50]

(*) Instructions to candidates:

- 1) Answer Q.1, Q.2, Q.3, Q.4, Q.5 OR Q.6, Q.7 OR Q.8
- 2) Figures to the right indicate full marks.
- 3) Use of scientific calculator is allowed
- 4) Use suitable data where ever required

Q.1) a)	Describe the Water Hammer Effect with the help of diagrams	[6]
	OR	
b)	What are the types of Drag Force?	[6]
Q.2) a)	Describe the velocity distribution profile in open channel flow	[6]
	OR	
b)	What are the factors affecting Manning's roughness coefficient	[6]
Q.3) a)	Classify the types of hydraulic jumps as per Froude number.	[6]
	OR	
b)	Define Specific energy and specific force with help of diagrams and explain in brief.	[6]
Q.4) a)	Explain with diagram C1 and C3 GVF profiles.	[4]
	OR	
b)	Explain with diagram A2 and A3 GVF profiles.	[4]
Q.5) a)	Derive the expression of total force exerted on the stationary curved vane by the jet when the jet is striking at one of it's tips of vane.	[6]
b)	Derive the expression of total force exerted on the stationary flat plate held normal to the jet	[4]
C)	A jet of water 10 cm in diameter moves with a velocity 25m/s and strikes on a series of flat plates fixed on the periphery of wheel. If due to impact the wheel rotates at 100 rpm, calculate forced exerted by the jet on the plate and work done on the plate.	[4]
	OR	

Q.6) a)	Derive the expression of total force exerted on the inclined moving flat plate by the jet.	[6]
b)	What are the advantages of centrifugal pump	[4]
c)	A jet of water strikes a stationary curved vane tangentially without shock at the inlet tip with a velocity of 30m/s . The direction of jet is deflected through an angle 60° from the original direction and there is 20% reduction in velocity when the jet passes over the vane. If the weight of the striking the vane is 20 N/s, calculate the magnitude and direction of the resultant force on the vane.	[4]
Q. 7) a)	Write the design steps of Pelton wheel turbine	[6]
b)	A pelton wheel is to be designed for the following specifications : shaft power = 9250kw, head = 325 m, speed = 750 rpm, overall efficiency = 80% . Jet diameter not to exceed $1/6^{\text{th}}$ of wheel diameter . Take $C_v = 0.98$, $\phi = 0.46$. Determine number of jets required , diameter of wheel , jet diameter.	[4]
c)	Define mechanical efficiency, volumetric efficiency	[4]
OR		
Q. 8) a)	Write a note on cavitation of a turbine.	[6]
b)	Determine the power given by the jet of water to the runner of a Pelton wheel which is having tangential velocity of 25 m/s. The net head on the turbine is 50 m and discharge through the jet of water is $0.03 \text{ m}^3/\text{s}$. The blade angle at the outlet is 15° and coefficient of velocity is 0.98.	[4]
c)	Write the different heads of hydraulic turbines	[4]