

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

CRM08

Rev 1.10

<CV>

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CONTINUOUS INTERNAL EVALUATION - 2

Dept:CV	Sem / Div: 3	Sub:Fluid Mechanics	S Code: 18CV33
Date: 12/1/22	Time:9.30-11Am	Max Marks: 50	Elective: N

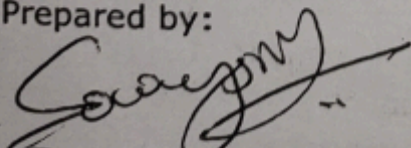
Note: Answer any 2 full questions, choosing one full question from each part.

QN	Questions	Ma rks	RBT	CO's
PART A				
1 a	Derive the continuity equation for three dimensional flow in Cartesian coordinate system	7	L2	CO2
b	The velocity components in two-dimensional incompressible flow field are expressed as $u = y^3/3 + 2x - x^2y$ and $v = xy^2 - 2y - x^3/3$ Determine velocity and acceleration at point P (x=1m, y=3m)	8	L3	CO2
c	The velocity potential function for a two dimensional flow $\phi = x^2(3y - 2)$. At a point P(2,3) determine: i) velocity at that point. 6, ii) The value of stream function(ψ) at the point	10	L3	CO2
OR				
2 a	Show that for a pitot tube actual velocity $V = C_d \sqrt{2gh}$ with usual notations.	7	L2	CO3
b	In a two-dimensional incompressible flow, the fluid velocity components are given by $u = x - 4y$ and $v = -y - 4x$. Show that velocity potential exists and determine its form. Find also the stream function	8	L2	CO2
c	The velocity potential function $\phi = -Xy/3 - X^2 + X^3y + y^2$ i) Find the velocity component in x and y directions. ii) Show that ϕ represents a possible case of fluid flow.	10	L3	CO2

PART B

3	a	What are the different energies of flowing fluid and explain each one of them	5	L2	CO3
	b	A horizontal venturimeter is provided in a pipe of 30cm diameter conveying water. The throat diameter is 15cm. If the pressure in the pipe is 160 kN/m ² and the vacuum pressure of the throat is 35cm of mercury. Find the rate of flow in the pipe. Assume $C_d = 0.98$.	10	L2	CO3
	c	1) A pitot static tube is used to measure velocity of water in a pipe. The stagnation pressure head is 6m and the static pressure head is 5m. Calculate the velocity of flow. Assume $C_v = 0.98$. 2) Derive the expression for discharge through a venturimeter	5 5	L3 L2	CO3
OR					
4	a	Derive the Bernoulli's energy equation from the Euler's motion equation, mentioning clearly the assumption made in the derivation.	7	L2	CO3
	b	A pipeline carrying oil of specific gravity 0.87 changes in diameter from 200mm diameter at a position A to 500mm 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 5.886 N/cm ² respectively and the discharge is 200 lt/sec. Determine the loss of head and direction of flow.	8	L2	CO3
	c	A horizontal venturimeter with inlet diameter 30cm and throat diameter 15cm is used to measure the flow of oil of specific gravity 0.8. The discharge of oil through venturimeter is 50 litres/sec. Find the reading of the oil-mercury differential manometer. Take $C_d = 0.98$	10	L3	CO3

Prepared by:


Dr. Sowmya N J

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