Total No. of Questions – [3]

Total No. of Printed Pages: 1

G.R. No.	

Paper Code – U239 – 114(T1)

OCTOBER 2019 INSEM (T1)

S. Y. B.TECH. (CIVIL) (SEMESTER – III)

COURSE NAME: Introduction to Fluid Mechanics

COURSE CODE: CVUA21184

(PATTERN 2018)

Time: [1 Hour]

[Max. Marks: 20]

(*) Instructions to candidates:

1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed.
4) Assume suitable data where ever required.

Q.1		Attempt any **one**	M
	a	Using Buckingham's π–theorem, show that the discharge over a weir is given by: $Q = VL^2 f[\sqrt{gL}/V, H/L]$; Where Q= discharge, V=Velocity, H=head causing flow, L= Length of weir, g=acceleration due to gravity	8
	b	The velocity distribution near the solid wall at a section in a laminar flow is given as : $U = 5\sin(5\pi y)$. For $y \leq 0.1$m. Compute shear stress at a section at y = 0, y = 0.1m. Take dynamic viscosity of the fluid as 5 poise	4
		Calculate the pressure in excess of outside pressure in case of (a) a droplet of water 3mm in diameter and b) a jet of water 3mm in diameter $\sigma_{water} = 0.073$ N/m	4
Q.2		Attempt any **one**	
	a	A cylindrical buoy is 2 m in diameter and 2.5 m long and weighs 22 kN. The specific weight of sea water 10.25 kN/m³. Show that buoy does not float with its a vertical.	8
	b	A sliding gate 3m wide and 1.5m high situated in a vertical plane has coefficient of friction between itself and guide of 0.2. If the gate weighs 18 kN and its upper edge is at a depth of 9m what vertical force is required to raise it? Neglect buoyancy.	8
Q.3		Attempt any **one**	
	a	$u = 2x - x^2y + \frac{y^3}{3}$, $v = xy^2 - 2y - \frac{x^3}{3}$; Is the flow possible? If so obtain an expression for stream function.	4
	b	Verify whether following functions are valid potential functions? $\Phi = A(x^2-y^2)$, $\Phi = A\cos x$	4