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**BE - SEMESTER- IV EXAMINATION - SUMMER 2020** 

Subject Code: 3140611 Date:04/11/2020

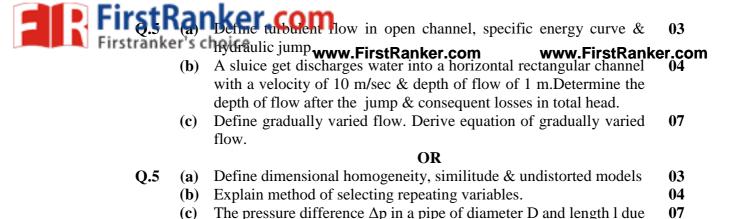
**Subject Name: Fluid Mechanics & Hydraulics** 

Time: 10:30 AM TO 01:00 PM Total Marks: 70

## **Instructions:**

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.

<b>Q.1</b>	(a)	Define density, specific volume & surface tension.	03
	<b>(b)</b>	The velocity distribution for flow over a flat plate is given by	04
	, ,	$u = 0.75 \text{ y} - y^2 \text{ in which } u \text{ is the velocity in metre per second at a}$	
		distance y metre above the plate. Determine the shear stress at	
		y = 0.20 m. Take dynamic viscosity of fluid as 8.0 poise.	
	(c)	Explain the phenomenon of capillarity. Obtain an expression for	07
	. ,	capillary rise of a liquid.	
Q.2	(a)	Define atmospheric, absolute & vaccum pressure.	03
_	<b>(b)</b>	Explain hydrostatic paradox.	04
	(c)	Write short note on manometers.	<b>07</b>
		OR	
	(c)	State & prove Pascal's law.	<b>07</b>
Q.3	(a)	Define total pressure, centre of pressure & buoyancy.	03
	<b>(b)</b>	A rectangular plane surface is immersed vertically in water such that	04
		its upper edge is touching free surface of liquid. Show that the depth	
		of centre of pressure is 2/3 d for rectangular surface of width b and	
		depth d.	
	<b>(c)</b>	Define metacentre & metacentric height. How will you determine	<b>07</b>
		metacentric height of a floating body experimentally? Explain with	
		neat sketch.	
		OR	
<b>Q.3</b>	(a)	Define stream lines, streak lines & flow net.	03
	<b>(b)</b>	Differentiate between (i) Uniform & non uniform flow (ii) Sub	04
		critical & super critical flow.	
	<b>(c)</b>	State & prove Bernoulli's equation & write assumption made for	<b>07</b>
		such a derivation.	
<b>Q.4</b>	(a)	Define orifice, mouthpiiece & notches.	03
	<b>(b)</b>	Find the discharge of water flowing over a rectangular notch of 2.0	04
		m length when the constant head over the notch is 500 mm. Take C <sub>d</sub>	
	(-)	= 0.62	07
	<b>(c)</b>	Differentiate between small & large orifice. Obtain an expression	07
		for discharge through large orifice.	
0.4	(0)	OR  Define major energy lesses in pine hydroulic gradient line & total	02
Q.4	(a)	Define major energy losses in pipe, hydraulic gradient line & total energy line.	03
	<b>(b)</b>	Three pipes of lengths 800 m, 500 m and 400 m and of diameters	04
	(D)	500 mm, 400 mm & 300 mm respectively are connected in series.	V4
		These pipes are to be replaced by a single pipe of length 1700 m.	
		Find the diameter of the single pipe.	
	(c)	Define viscous flow. Derive expression for Hagen-Poiseuille's	07
	(6)	formula.	07
		13/111134134	



to viscous flow depends on the velocity V, viscosity  $\mu$  & density  $\rho$ .

Using Buckingham's  $\pi$  theorem obtain an expression for  $\Delta p$ .

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