DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE

End Semester Examination – Winter 2018

Course: B. Tech in Civil Engineering **Sem: III**

Subject Name: Hydraulics I **Subject Code: BTCVC303**

Max Marks: 60 **Date: 05-12-2018** **Duration: 3 Hr.**

Instructions to the Students:

1. *Solve **all** questions out of the following.*
2. *The level question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in front of the question.*
3. *Use of non-programmable scientific calculators is allowed.*
4. *Assume suitable data wherever necessary and mention it clearly.*

		(Level/CO)	Marks
Q. 1	**Solve Any Three of the following.**		
A)	Explain the different applications of Fluid Mechanics in Civil Engineering.	**CO2**	**04**
B)	Define: Surface Tension and Bulk modulus. Give proper unit of each.	**CO2**	**04**
C)	Calculate the dynamic viscosity of oil, which is used for lubrication between a square plate of size 0.8 x 0.8 m^2 and plane with angle of inclination 30°. The weight of square plate is 294.5 N and it slides down the inclined plane with uniform velocity of 0.3m/s. The thickness of an oil film is 1.5mm.	**CO2**	**04**
D)	When a pressure of 20.7MN/m^2 is applied to 100 liters of a liquid, it's volume decreases by 1 liter. Find the bulk modulus of the liquid and compressibility of liquid.	**CO2**	**04**
Q.2	**Solve Any Two of the following.**		
A)	Explain in detail with neat sketch – i) Differential U-Tube Manometer ii) Bourdon Tube Pressure Gauge	**CO2**	**06**
B)	Prove that the center of pressure of a vertical plane surface is always below the center of gravity.	**CO3**	**06**
C)	A wooden block of relative density 0.7 has width 15cm, depth 30cm and length 150cm. it floats horizontally on the surface of water. Calculate the volume of water displaced, depth of immersion and position of center of buoyancy. Also find the metacentric height.	**CO3**	**06**
Q.3	**Solve the following.**		
A)	Derive a three dimensional general continuity equitation in Cartesian co-ordinates.	**CO3**	**06**
B)	The velocity of component in a two dimensional flow are $u = 2xy \quad v = b^2+x^2-y^2$	**CO3**	**06**
	i) Is the flow possible?		
	ii) Determine potential function.		
	iii) Determine corresponding stream function.		

Q.4 Solve Any Two of the following

A)	Derive an expression for point velocity distribution for laminar flow between two fixed parallel plates.	**CO3**	**06**
B)	Explain with neat sketches the difference between hydro dynamically smooth & rough boundaries.	**CO2**	**06**
C)	Explain Prandtl's Mixing Length Theory and Nikuradse's experiment.	**CO2**	**06**

Q. 5 Solve Any Two of the following.

A)	Write short note on Non-dimensional numbers – i) Froude number ii) Weber Number iii) Reynold's Number.	**CO3**	**06**
B)	Explain concept of equivalent pipe & Derive Dupit's equation in form $\frac{L}{D^5} = \frac{L_1}{D_1^5} + \frac{L_2}{D_2^5} + \frac{L_3}{D_3^5} + \cdots$	**CO3**	**06**
C)	What is Siphon? Explain its working with neat sketch.	**CO2**	**06**

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