

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 $0.8 \times 0.8 \text{ m}^2$ 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 20.7 MN/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 equation in Cartesian co-ordinates.	CO3	06
B) The velocity of component in a two dimensional flow are $u = 2xy$ $v = b^2 + x^2 - y^2$ i) Is the flow possible? ii) Determine potential function. iii) Determine corresponding stream function.	CO3	06

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 **CO3 06**
- $$\frac{L}{D^5} = \frac{L_1}{D_1^5} + \frac{L_2}{D_2^5} + \frac{L_3}{D_3^5} + \dots$$
- C) What is Siphon? Explain its working with neat sketch. **CO2 06**

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