Code No: 153AX

**R18**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**
**B. Tech II Year I Semester Examinations, March - 2021**
**FLUID MECHANICS**
**(Civil Engineering)**

Time: 3 hours

Max. Marks: 75

**Answer any five questions**
**All questions carry equal marks**
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1.a) State Newton's law of viscosity. Define viscosity. What are the types of viscosity? Explain how viscosity varies with temperature.
 b) State and prove Pascal's law along with a neat diagram. [8+7]

2.a) Define pressure. Explain how pressures varies with temperature, density and altitude. Name the devices used to measure pressure.
 b) Show that the center of pressure of lamina immersed vertically under liquid is always below its centroid. [7+8]

3. A uniform flow of 10m/s is flowing over a doublet of strength 15m²/s. The doublet is in the line of the uniform flow. The polar co-ordinates of a point P in the flow field are 0.9m and $30^0$. Find:
 a) Stream line function and b) the resultant velocity at the point.[8+7]

4.a) Define stream function and velocity potential function.
 b) Differentiate between forced vortex and free vortex flow. [8+7]

5. Find an expression for the discharge over a rectangular weir in terms of head of water over the crest of the weir. [15]

6. State continuity equation and Bernoulli's equation. Mention the assumptions made. How is it modified while applying in practice? List out its engineering applications. [15]

7. What are the energy losses? Derive an equation for Head loss due to sudden contraction in pipes. [15]

8. How will you find the drag on a flat plate due to laminar and turbulent boundary layers? [15]

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