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Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (CE) (2012 to 2017) (Sem.-3)

FLUID MECHANICS-I

Subject Code : BTCE-301

M.Code : 56072

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**Answer briefly :**

1. What is a manometer? How are they classified?
2. Differentiate between Newtonian and Non-Newtonian fluids.
3. Differentiate between forced vortex and free vortex flow.
4. Define Centre of Buoyancy.
5. What are Secondary or Derived quantities? Explain with an example.
6. Define the terms Nappe and Crest.
7. What is the difference between an Orifice and a Mouthpiece?
8. One liter of crude oil weighs 9.6 N. Calculate its density and specific gravity.
9. Define Pascal's law.
10. What is the difference between rotational and irrotational flow?

SECTION-B

11. Calculate the capillary rise in a glass tube of 2.5 mm diameter, when immersed vertically in (a) water, (b) mercury. Take $\sigma = 0.0725$ N/m for water, $\sigma = 0.52$ N/m for mercury in contact with air. Specific gravity of mercury = 13.6 and Angle of contact = 130° .
12. The velocity potential function is given by $\phi = 5(x^2 - y^2)$. Calculate the velocity components at the point (4,5).
13. Define Vena Contracta. Derive the expression $C_d = C_v \times C_c$.
14. What are the various conditions of equilibrium of a floating and a submerged body?
15. State Buckingham's π theorem. Why is this theorem considered superior to Rayleigh's method for dimensional analysis?

SECTION-C

16. Starting with Euler's equation of motion along a streamline, obtain Bernoulli's equation. List all the assumptions made.
17. Show that in a venturimeter, the quantity of water passing through will be proportional to the measured Venturi head H , if the head lost in friction is proportional to the head difference due to increased velocity.
18. A tank has an upper cylindrical portion of 2.5 m diameter and 3 m high with hemispherical base. Find the time required to empty it through an orifice of 8 cm diameter at the bottom, if the tank is initially full of water. Take $C_d = 0.6$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.