SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

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B.Tech. || CE || 3rd Sem
Fluid Mechanics –1
Subject Code: BTCE-301
Paper ID:

Time allowed: 3 Hrs

Max Marks: 60

Important Instructions:
- All questions are compulsory
- Assume any missing data

PART A (10x 2marks)

Q. 1.   Short-Answer Questions:
(a) How would you describe laminar boundary layer and turbulent boundary layer?
(b) What do you mean by vacuum pressure?
(c) What do you understand by the term drag?
(d) What is a venturimeter?
(e) Convert 1 kg/s-m dynamic viscosity in poise.
(f) What are the advantages of triangular notch over rectangular notch?
(g) What do you understand from Newton's law of viscosity?
(h) How would you explain fundamental quantities?
(i) What are the methods of dimensional analysis?
(j) What do you understand by the term orifice?

PART B (5×8marks)

Q. 2.   Find the kinematic viscosity of an oil having density 981kg/m^3. The shear stress at a   CO1
point in oil is 0.2452N/m2 and velocity gradient at that point is 0.2 per second.

OR

CO1

Explain the following terms:-
(i)   Newtonian and Non- Newtonian Fluids (ii) Vapour Pressure (iii) Gauge
Pressure (iv) Absolute Pressure

Q. 3.   A solid cylinder of diameter 4.0 m has a height of 4.0 m. Find the meta-centric height   CO2
of the cylinder if the specific gravity of the material of cylinder = 0.6 and it is
floating in water with its axis vertical. State whether the equilibrium is stable or
unstable.

OR

How would you determine the horizontal and vertical components of the resultant   CO2
pressure on a sub-merged curved surface?

Q. 4.   A 25 cm diameter pipe carries oil of specific gravity 0.9 at a velocity of 3m/s. At   CO3
another section the diameter is 20 cm. Find the velocity at this section and also mass
rate of flow of oil.

OR   CO3

A fluid flow field is given by $V=x^2yi + y^2zj - (2xyz + yz^2)k$ Prove that it is a case

of possible steady incompressible fluid flow. Calculate the velocity and acceleration at the point (2,1,3).

Q. 5. Water is flowing through a pipe of diameter 30 cm at a velocity of 4 m/s. Find the velocity of oil flowing in another pipe of diameter 10 cm, if the condition of dynamic similarity is satisfied between the two pipes. The viscosity of water and oil is given as 0.01 poise and .025 poise. The sp. gr. of oil = 0.8   CO4

OR   CO4

What is the difference between U- tube differential manometers and inverted U-tube differential manometers? Where are they used?

Q. 6. State Bernoulli's theorem for steady flow of an incompressible fluid. Derive an expression for Bernoulli's theorem from first principle and also state the assumptions.   CO5

OR   CO5

What do you mean by 'Terminal velocity of a body'? What is the relation between the weight of the body, drag force on the body and buoyant force when the body has acquired terminal velocity?