Total no. of printed pages:5 **D/4th/DCE403**

2021

FLUID MECHANICS

Full Marks: 60

Time: Two hours

The figures in the margin indicate full marks for the questions

A. Multiple Choice Questions 1 x 20=20

1. Bulk modulus is the ratio of
   a. volumetric strain to compressive stress
   b. volumetric strain to shear stress
   c. shear stress to volumetric strain
   d. compressive stress to volumetric strain
2. Which of the following is a dimensionless equation
   a. Reynold's equation
   b. Weber's equation
   c. Euler's equation
   d. All of the above
3. The highest point of syphon is called as
   a. summit
   b. Syphon head
   c. reservoir
   d. None of the above
4. Which of the following devices does not use Bernoulli's equation as its working principle
   a. Orifice meter
   b. Pitot tube
   c. Venturimeter
   d. None of the above

5. What is the correct formula for loss at the exit of a pipe
   a. $h_L = 0.5 (V^2 / 2g)$
   b. $h_L = (4 V^2 / g)$
   c. $h_L = (2 V^2 / g)$
   d. $h_L = (V^2 / 2g)$
6. Minor losses occur due to
   a. sudden enlargement in pipe
   b. sudden contraction in pipe
   c. bends in pipe
   d. all of the above
7. The head loss through fluid flowing pipe due to friction is
   a. the minor loss
   b. the major loss
   c. both a. and b.
   d. none of the above
8. The study of force which produces motion in a fluid is called as
   a. fluid statics
   b. fluid dynamics
   c. fluid kinematics
   d. none of the above
9. In which method of describing fluid motion, the observer remains stationary and observes changes in the fluid parameters at a particular point only
   a. Lagrangian method
   b. Eulerian method
   c. Stationary method
   d. All of the above
10. Atmospheric pressure held in terms of water column is
   a. 7.5m
   b. 8.5m
   c. 9.81m
   d. 10.30m

11. When is a liquid said to be not in a boiling or vaporized state?
    a. If the pressure on liquid is equal to its vapour pressure
    b. If the pressure on liquid is less than its vapour pressure
    c. If the pressure on liquid is more than its vapour pressure
    d. Unpredictable
12. Hydraulic gradient line represent the sum of
    a. Pressure head and kinetic head
    b. Kinetic head and datum head
    c. Pressure head and datum head
    d. Pressure head, kinetic head and datum head
13. Pitot tube is used to measured
    a. Discharge
    b. Average velocity
    c. Velocity at a point
    d. Pressure at a point
14. The continuity equation P1V1A1=P2V2A2 is based on the following assumption regarding flow of fluid (where P1and P2 are mass densities)
    a. steady flow
    b. incompressible
    c. frictionless flow
    d. uniform flow
15. Mercury does not wet glass this is due to the property of liquid known as
    a. Adhesion
    b. Cohesion
    c. viscosity
    d. Surface tension
16. The property of a liquid which offers resistance to the movement of one layer of liquid over another adjacent layer of liquid is called
    a. capillarity
    b. Surface tension

c. viscosity

d. compressibility

17. Manometer is used to measure

a. Very low pressure

b. pressure in channels and pipe

c. velocity

d. atmospheric pressure

18. Square root of the ratio of inertia force to elastic force is called as

a. Mach's Number

b. Reynold's Number

c. Both a. and b.

d. None of the above

19. What is the correct formula for absolute pressure?

a. $P_{abs} = P_{atm} - P_{gauge}$

b. $P_{abs} = P_{vacuum} - P_{atm}$

c. $P_{abs} = P_{vacuum} + P_{atm}$

d. $P_{abs} = P_{atm} + P_{gauge}$

20 Which property of the fluid offers resistance to deformation under the action of shear force?

a. density

b. viscosity

c. permeability

d. specific gravity

B. Very Short Questions 2*6=12

1. What is the difference between steady flow and unsteady flow
2. Define the term major energy loss and minor energy loss
3. Differentiate between absolute and gauge pressure, simple manometer and u tube manometer
4. A hydraulic press has a ram of 30 cm diameter and plunger of 5 cm diameter. Find the weight lifted by the hydraulic press when the force applied at the plunger is 400N.
5. The pressure intensity at a point in a fluid is given by $3.924 N/cm^2$. Fine the

corresponding height of the fluid when the fluid is i) water ii) oil of specific gravity 0.9

6. Define Froude's number and Reynold's number

C Short Questions 4*7=28

1. Derive continuity equation in three dimension
2. The velocity vector in a fluid flow is given:

   $V= 4x^3i-10x^2j+2tk$, Find the velocity and acceleration of a fluid at (2,1,3) at t=1
3. Explain various types of fluid flow
4. Derive Bernoulli's equation from Euler's equation of motion
5. What is Venturimeter? Derive an expression for the discharge through a Venturimeter
6. State and prove the Pascal's law
7. Explain various types of energy losses through pipe