University of Mumbai

Civil Engineering Examination

Sub: CEC306/ Fluid Mechanics -I　　　　**Year/Sem:- SE/ III Sem**
Max. Marks: 80　　　　　　　　　　　　　**Duration: - 2Hrs**

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Q1. Attempt all the MCQS　　　　　　　　　　**(20 X 2 mark= 40 marks)**

1. The study of fluid at rest is called as
    a) Statics
    b) dynamics
    c) kinetics
    d) kinematics

2. The property of fluid which offers resistance to movement of one layer of fluid over another adjacent layer of fluid is called as
    a) Surface Tension
    b) Viscosity
    c) Capillarity
    d) Adhesion

3. A real fluid where shear stress is not proportional to shear strain is called as
    a) Ideal Fluid
    b) Newtonian Fluid
    c) Non Newtonian Fluid
    d) Ideal Plastic fluid

4. Which law states that pressure or intensity of pressure in a static fluid is equal in all directions
    a) Pascal's Law
    b) Hydrostatic Law
    c) Newton's law of viscosity
    d) Bernoulli's Equation

5. When will the body be stable in fluid
    a) When M is above G
    b) When M is below G
    c) When M and G coincide
    d) When M and G are adjacent

6. Pressure measured above atmospheric pressure is known as
    a) Absolute Pressure
    b) Gauge Pressure
    c) Vaccum Pressure
    d) Absolute zero pressure

7. The imaginary line drawn in the fluid in such a way that the tangent to any point gives the direction of motion at the point, is called as
    a) Path line
    b) Streak line

c) Stream line
d) Filament line

8. If stream function (Ψ) satisfies the Laplace equation, it is a possible case of
   a) Circular flow
   b) Rotational flow
   c) Irrotational flow
   d) None of the above

9. Which acceleration has a nonzero value in uniform flow?
   a) Local acceleration
   b) Convective Acceleration
   c) Both local and convective acceleration
   d) unpredicatble

10. The rate of increase of velocity with respect to change in the position of fluid particle in a flow field is called as
    a) Local acceleration
    b) Convective acceleration
    c) Temporal acceleration
    d) All of the above

11. Which is the application of Bernoulli's Equation
    a) Pitot Tube
    b) Rotameter
    c) Orifice meter
    d) All the above

12. Which force is neglected in Euler's Equation
    a) Gravitational
    b) Pressure
    c) Compressibility
    d) Shear Force

13. What does the tangent drawn on any point on the stream line indicate
    a) direction of flow
    b) direction of velocity vector
    c) direction of pressure force
    d) direction of potential function

14. Which of the following is not a way of classifying notches or weirs?:
    a) Based on the shape of opening
    b) Based on the effect of the sides on the nappe
    c) Based on the shape of the crest
    d) Based on the effect of the sides on the crest

15. Which of the following is not a way of classifying based on the shape of opening?
    a) Rectangular notch
    b) Circular notch
    c) Trapezoidal notch
    d) Stepped notch

16. Trapezoidal weir has another popular name. What is it?
    a) Cipolletti weir
    b) Hagen Poiseuille's weir
    c) Reynold's weir
    d) Euler's weir

17. What is not the way of classifying weir based on their shape of crest?
    a) Sharp crested weir
    b) Broad crested weir
    c) Narrow crested weir
    d) Trapezoidal crested weir

18. A fluid which is incompressible and inviscid is called as
    a) Newtonian
    b) Non Newtonian
    c) Ideal
    d) Real

19. If from a point, a fluid is flowing radially outwards, it is called
    a) Sink Flow
    b) Source Flow
    c) Potential Flow
    d) Free Vortex Flow

20. If the head of the liquid is less than 5 times the depth of orifice, the orifice is called
    a) Large Orifice
    b) Small Orifice
    c) Sharp edged orifice
    d) Bell mouth orifice

Q2. Attempt any FOUR   **(04 X 05 marks= 20 marks)**

1. Classify the different Types of Fluids with example and diagram
2. State and Derive Pascal's Law
3. Explain Langragian approach and Eularian approach in fluid mechanics
4. Obtain an expression for continuity equation for a three dimensional flow
5. Give the classification of mouthpieces Write a note on Rain water Harvesting Techniques.
6. Define Mach number. What is the significance of Mach number in compressible fluid flow.

Q3. Attempt any TWO   **(02 X 10 marks= 20 marks)**

1. Two large horizontal plane surface are 20mm apart. This space is filled with glycerin. Find what force is required to drag a very thin plate of area 0.60m2 between the two surfaces at a speed of 0.70m/s.
    i)   If the plate is equidistance from the two surfaces.
    ii)   If the plate is 7.50mm from one of the surfaces.

Take the dynamic viscosity of glycerin equal to 8.04 X 10-1N.s/m^2

2. A cylindrical buoy of 3m diameter and 4m long is weighing 150KN. Show that it cannot float vertically in water.
3. If $\Phi = 3xy$, find x and y components of velocity at (1,3) and (3,3). Determine the discharge passing between streamlines passing through these points.
4. Find the discharge of water flowing through a pipe of 30cm diameter placed in an inclined position where a venturimeter is inserted having a throat diameter of 15cm. the difference of pressure between the main and throat is measured by a liquid of sp.gravity 0.6 in an inverted U-tube which gives a reading of 30cm. The loss of head between the main and throat is 0.2 times the kinetic head of the pipe.