SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

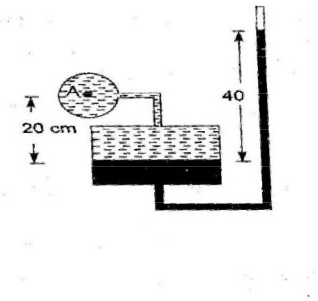
Subject with Code : FM(15A01305) **Course & Branch**: B.Tech - CE

Year & Sem: II-B.Tech & I-Sem **Regulation:** R15

UNIT –I

Introduction to Fluid Mechanics and Hydrostatic Forces on Surfaces

1. a) State Pascal's law. What do you understand by the terms Absolute, Gauge, atmospheric & Vacuum pressure. 5M
   b) What is the gauge pressure at a point 3m below the free surface of a liquid having a density of 1.53 X 10^3 kg/m^3.If the atmospheric pressure is equivalent to 750mm of mercury? The Specific gravity of mercury is 13.6 and density of water = 1000 kg/m^3 5M
2. Define Manometer. Briefly explain the types of manometers in detail. 10M
3. a) A simple U – tube manometer containing mercury is connected to a pipe in which a fluid of specific gravity 0.8 and having vacuum pressure is flowing. The other end of the manometer is open to atmosphere. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20 cm. 5M
   b) A single column manometer is connected to a pipe containing a liquid of specific gravity 0.9 as shown in fig. Find the pressure in the pipe if the area of the reservoir is 100 times the area of the tube for the manometer reading shown in fig. The specific gravity of mercury is 13.6. 5M



4. a) An inverted U – tube manometer is connected to two horizontal pipes A and B though which water is flowing. The vertical distance between the axes of these pipes is 30 cm. When an oil of specific gravity 0.8 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (when measured from the respective centre lines of the pipes) are found to be same and equal to 35 cm. Determine the difference of pressure between the pipes. 5M

b) A 15 cm diameter vertical cylinder rotates concentrically inside another cylinder of diameter 15.10 cm. Both cylinders are 25 cm high. The space between the cylinders is filled with a liquid whose viscosity is unknown. If a torque of 12.0 Nm is required to rotate the inner cylinder at 100 r.p.m, determine the viscosity of the fluid. 5M

5. a) Define Hydro static law and derive the condition for pressure head 5M

b) Derive the codition for pressue in vertical single column manometer. 5M

6. Derive expressions for the total pressure and centre of pressure for an inclined plane surface submerge in the liquid. 10M

7. Explain how you would find the resultant pressure on a curved surface immersed in the liquid. 10M

8. Define centre of pressure and derive an expression for centre of pressure for a vertically submerged surface. 10M

9. A cylinder having 3m diameter and 1.5 m length is resting on the floor on one side, water is filled up to half the depth while on the other side oil of relative density 0.8 filled up to the top. If the weight of the cylinder is 33.75 kN, determine the magnitudes of the horizontal and vertical components of the force which will keep the cylinder just touching the floor. 10M

10. a) Define specific density and specific weight. 2M

b) What is dynamic viscosity of fluid and derive the condition for it. 2M

c) State absolute, gauge, atmospheric and vacuum pressue. 2M

d) What is vapour pressure? 2M

e) Define cavitation. 2M

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UNIT – I

Introduction to Fluid Mechanics and Hydrostatic Forces on Surfaces

1. The force per unit area is called [ ]

A) Pressure B) Strain C) Surface tension D) none

2. The pressure _____as the depth of the liquid increases [ ]

A) Increases B) Decreases C) Remain constant D) None

3. The simplest form of manometer which can be used for measuring moderate pressures of liquid is [ ]

A) Piezometer B) Differential manometer C) U-tube manometer D) None

4. Which of the following is a mechanical guage [ ]

A) Diaphragm guage B) Dead weight pressure C) Bourdon tube pressure D) All of the above

5. The devices used for measuring the pressure at a point in a fluid by balancing the column fluid by the same or another column liquid are known as [ ]

A) Mechanical gauges B) Manometers C) U-Tube manometer D) None

6. Which of the following is a possibility of dam failure [ ]

A) Failure due to sliding along its base B) Failure due to tension or compression

C) Failure due to shear at the weakest section D) All of the above

7. The surface tension is due to [ ]

A) Cohesion and Adhesion B) Cohesion only C) Adhesion only D) None of the above

8. Cavitation is caused by [ ]

A) High velocity B) Low pressure C) High pressure D) High temperature

9. Centre of pressure (h) in case of inclined immersed surface is given by [ ]

A) $h=I_G \sin \Theta/Ax + x$ B) $h=I_G \sin \Theta/A^2x + x$ C) $h= I^2_G \sin \Theta /Ax + x$ D) $h= I_G\sin^2\Theta/Ax + x$

10. Total force on a curved surface is given by [ ]

A) $p= (p^2_h+p^2_v)^{3/2}$ B)$p=(p^2_h+p^2_v)^{1/2}$ C)$p=(p^2_h+p^2_v)^{5/2}$ D)$p=p_h+p_v$

11. The ideal fluid is defined as the fluid which is [ ]

A) is compressible B) is incompressible C) is incompressible and non-viscous D) Real fluid

12. A Newtonian fluid is defined as the fluid which [ ]

A) is incompressible and non-viscous B) obey Newton's law of viscosity

C) is highly voscous D) is compressible and viscous

13. Kinematic viscosity is defined as equal to [ ]

A) Dynamic viscosity x density B) dynamic viscosity /density

C) Dynamic viscosity x pressure D) pressure x density

14. The dimensions of dynamic viscosity is [ ]

A) MLT^{-2} B) $ML^{-1}T^{-1}$ C) $ML^{-1}T^{-2}$ D) $M^{-1}L^{-1}T^{-1}$

15. Poise is the unit of [ ]

A) Mass density B) Kinematic viscosity C) Viscosity D) Velocity gradient

16. Stoke is the units of [ ]

A) Surface tension B) Viscosity C) Kinematic viscosity D) Velocity gradient

17. Pascel's law states that pressure at a point is equal in all directions [ ]

A) In a liquid at rest B) In a fluid at rest C) In a laminar flow D) In a turbulent flow

18. The hydrostatic law states that rate of increase of pressure in a vertical direction is equal to

[ ]

A) Density of fluid B) Specific weight of fluid C) weight of fluid D) None of the above

19. Guage pressure at a point is equal to [ ]

A) Absolute pressure plus atmospheric pressure B) Absolute pressure minus atmospheric pressure

C) Vacuum pressure plus absolute pressure D) None of the above

20. Atmospheric pressure held in terms of water column is [ ]

A) 705 m B) 8.5 m C) 9.81 m D) 10.3 m

21. The resultant hydrostatic pressure acts through a point known as [ ]

A) Centre of gravity B) Centre of buoyancy C) Centre of pressure D) None of an bove

22. Which of the following denotes the effect of compressibility in fluid flow [ ]

A) Euler number B) Mach number C) Weber number D) Reynolds number

23. The fluid in which the shearing stress within it is proportional to the velocity gradient across the sheared section, is called a [ ]

A) Binghim B) Newtonian C) Perfect D) None of these

24. The ratio of average fluid velocity to the maximum velocity in case of laminar flow of a Newtonion fluidin a circular pipe is [ ]

A) 2 B) 0.5 C) 1 D) 0.66

25. If the change in density occurs at constant temperature then the process is [ ]

A) Isothermal process B) Adiabatic process C) Insulation process D) vapour pressure

26. If the change in density occurs with no exchange of temperature then the process is [ ]

A) Isothermal process B) Adiabatic process C) Insulation process D) vapour pressure

27. If the temperature of liquid is increase then the viscosity of liquid is [ ]

A) Increases B) Constant C) Proportional D) Decreases

28. The density of mercury is [ ]

A) 13600 kg/m^3 B) 13400 kg/m^3 C) 12600 kg/m^3 D) 11600 kg/m^3

29. The relation be the specific volume and specific density is [ ]

A) Equal B) Proportional C) Constant D) Reciprocal

30. A fluid which possesses viscosity is known as [ ]

A) Ideal fluid B) Newtonian fluid C) Real fluid D) Ideal plastic fluid

31. The formula for calculating the pressure in case of surface tension on a liquid jet is [ ]

A) $P=4*\sigma/L$ B) $P=2*\sigma/L$ C) $P=8*\sigma/L$ D) $P=\sigma/L$

32. The angle of contact between liquid and glass tube for capillary fall is [ ]

A) 128^0 B) 120^0 C) 240^0 D) 140^0

33. The rate of increase in pressure in a vertical downward direction is equal to the specific weight [ ]

A) Pascel's law B) Constitutive law C) Column law D) Hydrostatic law

34. The pressure which is measure with reference to absolute vacuum pressure is [ ]

A) Absolute pressure B) Guage pressure C) Vacuum pressure D) None of these

35. The point of application of total pressure on a liquid surface is [ ]

A) Tota pressure B) Centre of pressure C) Surface tension D) Viscosity

36. The total pressure on a curved surface is [ ]

A) $F=\sqrt{Fx + Fy}$ B) $F=\sqrt{FX2 + FY}$ C) $F^2= FX^2+FY^2$ D) $F=\sqrt{FX} + FY2$

37. Difference between atmospheric pressure and absolute pressure is called [ ]

A) Vacuum pressure B) Absolute pressure C) Guage pressure D) Intensity of pressure

38. The sum atmospheric pressure and absolute pressure is called [ ]

A) Vacuum pressure B) Absolute pressure C) Guage pressure D) Intensity of pressure

39. Inclined single column manometer is useful for the measurement of [ ]

A) Pressure in tube B) Pressure in manometer C) Prssure in free end D) None of these

40. Any pressure measured above the absolute zero of pressure is termed as [ ]

A) Guage pressure B) Intensity of pressure C) Atmospheric pressure D)Vacuum pressure

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