SIDDARTHA INSTITUTE OF SCIENCE ANDTECHNOLOGY :: PUTTUR
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QUESTION BANK (DESCRIPTIVE)

Subject with Code : Fluid Mechanics (18CE0104) **Course & Branch: B.Tech - CE**

Year & Sem: II-B.Tech & I-Sem **Regulation**: R18

UNIT –I

FLUID PROPERTIES AND STATICS

1. a) State Pascal's law. What do you understand 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 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 hydraulic pipe has a ram of 30 cm diameter and a plunger of 4.5 cm diameter. Find the weight lifted by the hydraulic press when the force applied at the plunger is 500N?

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 30cm. 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) Derive expression for surface tension on liquid droplet and soap bubble? 5M

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

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

10M

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

8. a) Write short notes on viscosity, kinematic viscosity and Newton's law of viscosity? 5M

b) The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 2.5mm. The upper plate which moves at 2.5 m/sec requires a force of 9.81N to maintain the speed. Determine dynamic viscosity of the oil in poise and kinematic viscosity of oil if specific gravity of oil is 0.95

9. a) Explain the pressure variation in a fluid at rest? 5M

b) Define specific density and specific weight, viscosity, vapour pressure and cavitation? 5M

10.a) A rectangular plane surface 3 m wide and 4 m deep lies in water in such a way that its plane makes an angle of 30^{0} with the free surface of water. Determine the total pressure force and position of centre of pressure, when the upper edge is 2 m below the free surface. 5M

b) Find the magnitude and direction of the resultant force due to water acting on a roller gate of cylindrical form of 4 m diameter, when the gate is placed on the dam in such a way that water is just going to spill. Take the length of the gate as 8 m. 5M

UNIT –II

FLUID KINEMATICS

1. a) Define stream line, streak line and path line, stream tube and control volume? 5M

b) Write a brief note on continuity equation for a one- dimensional flow? 5M

2. Obtain an expression for continuity equation for a three - dimensional flow. 10M

3. a) The velocity potential function is given by Ø = 5(x2 – y2). Calculate the velocity components at the point (4, 5). 5M

b) A stream function is given by ψ = 5x – 6y. Calculate the velocity components and also magnitude and direction of the resultant velocity at any point.

4. show that the product of equi- streamline and equi- potential line is “ -1” ? and define flow net,equi-potential line , equi -stream lines ? 10M

5.The velocity vector in a fluid flow is given by V=4x+10xy+2k find the velocity and acceleration at fluid particle (2,1,3) & t=1 10M

6 a) If for a two – dimensional potential flow, the velocity potential is given by Ø = x(2y – 1). Determine the velocity at the point p (4, 5). Determine also the value of stream function Ψ at the point p.

b) The following case represent the two velocity components, determine the third velocity component such the they satisfy the continuity equation i) $u= x^2+y^2+z^2$, $v= xy^2-yz^2+xy$ and ii) $v=2y^2$, $w=2xyz$ 5M

8. a) What is the relation between stream function and velocity potential function? 5M

b) Write a short notes on the following i) Equipotential line ii) Line of constant stream function iii) Flow net 5M

9. a) Define compressible and incompressible flows.

b) Define laminar and turbulent flows.

c) Define uniform and non uniform flow.

d) Distinguish between rotational and irrotational flow.

e) Distinguish between steady and unsteady flow 10M

10. The velocity vector in a fluid flow $V= 4x^3i-10x^2yj+2tk$, find the velocity and acceleration of a fluid particle at (2, 1, 3) at time t=1.

UNIT –III

FLUID DYNAMICS

1. a) State Bernoulli's theorem for steady flow of an incompressible fluid. Derive the expression for Bernoulli's theorem from first principle and state the assumption made for such a derivation. 5M

b) A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 15 cm respectively. If the average velocity in the 30 cm diameter pipe is 2.5 m/s. Find the discharge in the pipe. Also determine the velocity in 15 cm pipe if the average velocity in 20 cm diameter pipe is 2 m/s. 5M

2. Derive the expression for actual discharge in venturimeter ? 10M

3. a) Find the expression for the Discharge over a Rectangular notch or weir 10M

b) In a 100mm diameter horizontal pipe a venture meter of 0.5 contraction ratio has been fixed. The head of water on the meter when there is no flow in 3m (gauge). Find the rate of flow for which the throat pressure will be 2m of water is 0.97 take atmospheric pressure head = 10.3m of water. 5M

4. A horizontal venture meter with 30cm diameter inlet and 10cm throat is used for measuring the flow of water through a pipeline. If pressure in pipe is 1.5kpa and the vacuum pressure at the throat is 40cm of mercury, calculate the rate of flow. It may be presumed that 5% of differential head is lost between the pipe main and the throat section. Also make calculations for the discharge co-efficient take specific weight of water = $10kN/m^3$ 10M

5. What is Euler's equation of motion? How do you obtain Bernoulli's equation from it? Name the different forces present in a fluid flow 10M

6. a) What is flowing through a pipe of 5 cm diameter under a pressure of $29.43N/cm^3$ (gauge) and with mean velocity of 2.0 m/s. Find the total head or total energy per unit weight of the water at a cross section which is 5 m above the datum line. 5M

b) Water is flowing through a pipe has diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is $24.525\ N/cm^2$ and the pressure at the upper end is $9.81\ N/cm^2$. Determine the difference in datum head if the rate of flow through pipe is 40 lit/s. 5M

7. An external cylindrical mouth piece of diameter 150 mm is discharging water under a constant head of 6 m. Determine the discharge and absolute pressure head of water at B vena – contracta. Take $C_d = 0.855$ and C_c for vena contracta = 0.62 and atmospheric pressure head = 10.3 of water.10M

8. a) An oil of Sg=0.8 is flowing through a venturimeter having inlet diameter 20cm and throat dia 10cm . the oil – Hg differential manometer shows a reading of 25 cm . calculater discharge of oil through horizontal venturimeter ? take Cd =0.98 5M

b) A horizontal venturimeter venturimeter having inlet diameter 20cm and throat dia 10cm is used to measure the flow of oil having Sg 0.8 the discharge of oil through venturimeter is 60l/s. find the reading of the oil – Hg in differential manometer ? C_d is 0.98 5M

9 a) Define hydraulic gradient line and total energy line. 5M

b) Explain briefly the analysis of free liquid jets. 5M

10. a) Explain Pitot tube with neat sketch ? 5M
b) A sub-marine moves horizontally on a sea and has its axis 15m below the surface of water. A pitot tube properly placed just in front of a sub-marine and along its axis is connected to two limbs of a u – tube containing mercury. The difference of mercury level is found to be 170mm find the speed of the sub-marine knowing that the specific gravity of mercury is 13.6 and that of sea water is 1.026 with respect of fresh water 5m

UNIT –IV

FLOW THROUGH PIPES

1. Derive the expression for head loss in pipes due to friction by Darcy - Weisbach equation and chezy's formula 10M
2. a) Derive the expression for flow through pipes in series. 5M
b) Derive the expression for flow through parallel pipes. 5M
3. Derive the expression for head loss in pipes due to sudden enlargement and sudden contraction formula 10M
4. The rate of flow of water through a horizontal pipe is $0.25m^3/s$. The diameter of the pipe which is 200 mm is suddenly enlarged to 400mm. The pressure intensity in the smaller pipe is $1.772N/cm^2$. Determine the i) Head loss due to sudden enlargement ii) Pressure intensity in the large pipe iii) Power lost due to enlargement 10M
5. A horizontal pipe of diameter 500mm is suddenly contracted to a diameter of 250mm. The pressure intensity in the larger and smaller pipe is given as 13.734 N/cm^2 and 11.772 N/cm^2 respectively. Find the head lost due to contraction if C_C is 0.63. Also determine the rate of flow of water? 10M
6. A Siphon of diameter 200 mm connects two reservoirs having a difference in elevation of 20 m. The length of the siphon is 500 m and the summit is 3.0 m above the water level in the upper reservoir. The length of the pipe from upper reservoir to the summit is 100 m. Determine the discharge through the siphon and also pressure at the summit. Neglect minor losses. The co efficient of friction is 0.005. 10M
7. A horizontal pipe line 40m long is connected to a water tank at one end and discharges freely into the atmosphere at the other end. For the first 25m of its length from the tank, the pipe is 150mm diameter and its diameter is suddenly enlarged to 300mm. the height of water level in the tank is 8m above the centre of the pipe line. Considering all losses of head which occur and determine the rate of flow take f=0.01 for both sections of pipe. 10M
8. The difference in water surface levels in two tanks which are connected by three pipes in series of lengths 300m, 170m and 210m and diameters of 300mm, 200mm and 400mm respectively is 4m. Determine the rate of flow of water if coefficients of friction are 0.005, 0.0052, 0.0048 respectively, considering i) minor losses ii) neglecting minor losses 10M
9. A pipe line of 0.6 m diameter is 1.5 km long. To increase the discharge, another line of same diameter is introduced parallel to the first in the second half of the length .Neglecting minor losses, find the increase in discharge if 4f = 0.04. The head at inlet is 300 mm. 10
10. a) Find the head lost due to friction in a pipe of diameter 300 mm and the length 50 m, through which water is flowing at velocity of 3 m/s using i) Darcy formula ii) Chezy's formula for which C=60 and kinematic viscosity 0.01 stokes? 5M
b) Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. The rate of flow of water through the pipe is 250 lit/s. 5M

UNIT –V

LAMINAR FLOW TURBULENT FLOW

1. Derive the Expression for maximum velocity for a Laminar flow through circular pipes? 10M

2. An oil of viscosity 0.1 Pa.s and relative density 0.9 is flowing through a horizontal pipe of diameter 50mm . if the pressure drop per meter length od pipe is 12 Kpa, determine
   a) Rate of flow in N/minute
   b) Shear stress at pipe wall
   c) Reynolds number of flow
   d) power required in W Per 50m length to maintain the flow 10M

3. Derive the equation for the flow of viscous fluid between two parallel plates? When plates are fixed 10M

4 . An oil of dynamic viscosity 1.05 poise and relative density 0.92 is flowing through a fixed parallel plates kept 1.2cm a part if the Mean Velocity is 1.40m/s. calculate
   a) The maximum velocity
   b) boundary shear stress
   c)velocity &shearstress at distance of 0.2 cm from plates
   d) Headloss at y=25m
10M

5. a) Explain the Reynolds's experiment with neat sketch 5M
   b) Define Reynolds's number and derive the expression for Reynolds's number? 5M

6 . Explain the difference between turbulent flow and Laminar flow ?and explain the causes of turbulent flow

10M

7. An oil of viscosity 0.1 Ns/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50mm and length 300 m. The rate of flow of fluid through a circular pipe is 3.5 lit/sec. Find the pressure drop in a length of 300m and also the shear stress at the pipe wall? 10M

8 .Mean point velocities measured with the help of a pitot tube at mid point and quarter point of a 0.2m dia pipe were found tobe 1.50m/s and 1.35m/s respectively .if the flow in pipe is turbulent . determine discharge , friction factor, and average heightof roughness projections 10M

9For a turbulent flow in apipe diameter 300mm ,find the discharge when center line velocity is 2m/s & velocity at appoint 100mm from center is 1.6m/s? 10M

10. Explain breifly about moodys diagram? 10M

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BIT BANK (OBJECTIVE)

Subject with Code : Fluid Mechanics (18CE0108) **Course & Branch: B.Tech - CE**

Year & Sem: II-B.Tech & I-Sem **Regulation: R18**

UNIT -I

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 gauge [ ]
A) Diaphragm gauge 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 viscous 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. Pascal'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. Gauge 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 above
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) Bingham 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 Newtonian fluid in 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) Pascal'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) Gauge pressure C) Vacuum pressure D) None of these
35. The point of application of total pressure on a liquid surface is [ ]
A) Total 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) Gauge pressure D) Intensity of pressure

38. The sum atmospheric pressure and gauge pressure is called [ ]
A) Vacuum pressure B) Absolute pressure C) Gauge 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) Pressure in free end D) None of these
40. Any pressure measured above the absolute zero of pressure is termed as [ ]
A) Gauge pressure B) Absolute pressure C) Atmospheric pressure D) Vacuum pressure

UNIT –II

FLUID KINEMATICS

1. Shear stress develops on a fluid element, if the fluid [ ]
A) is at rest B) if the container is subjected to uniform linear acceleration
C) is viscous D) is viscous and the flow is non-uniform
2. The resultant hydrostatic force acts through a point known as [ ]
A) Centre of gravity B) Centre of buoyancy C) Centre of pressure D) None of the above
3. Resultant pressure of the liquid in case of an immersed body acts through which one of the following
A) Centre of gravity B) Centre of pressure C) Metacenter D) Centre of buoyancy [ ]
4. What are the forces that influence the problem of fluid static [ ]
A) Gravity and viscous forces B) Gravity and pressure forces
C) Viscous and surface tension forces D) Gravity and surface tension
5. The fluid characteristics like pressure, velocity, density does not change w.r.t to time is [ ]
A) Steady flow B) Uniform flow C) Unsteady flow D) Laminar flow
6. The Euler equations of motion for the flow of an ideal fluid is derived considering the principle of conservation of [ ]
A) Mass and the fluid as incompressible and inviscous
B) Momentum and the fluid as incompressible and viscous.
C) Momentum and the fluid as incompressible and inviscous
D) Energy and the fluid as incompressible and inviscous
7. The expression (p + ρgz + ρv2/2) commonly used to express Bernoulli's equation, has units of
A) Total energy per unit mass B) Total energy per unit weight [ ]
C) Total energy per unit volume D) Total energy per unit cross - sectional area of flow
8. Bernoulli’s equation is derived making assumption that [ ]
A) The flow is uniform and incompressible B) The flow is uniform and turbulent
C) The flow is steady, ideal, incompressible and irrotational D) The flow is ideal, uniform
9. The Bernoulli’s equation can take the form [ ]
A) $\frac{p}{\rho g}+\frac{v2}{2g}+z=$Constant B) $\frac{1}{\rho g}+\frac{v2}{2g}+z=$Constant
C) $\frac{p}{g}+\frac{v2}{2g}+z=$Constant D) $\frac{p}{\rho g}+\frac{v2}{2g}-z=$Constant
10. If the flow is assumed to be ideal, the viscous force is zero then the equation is [ ]
A) Reynolds’s equation B) Navier-Stokes equation C) Euler’s equation D) Bernoulli’s equation
11. The flow in which the fluid particles moves in a zigzag path is called [ ]
A) Steady flow B) Uniform flow C) Turbulent flow D) Laminar flow
12. The fluid characteristics like pressure, velocity, density changes w.r.t to time is [ ]
A) Steady flow B) Uniform flow C) Unsteady flow D) Laminar flow
13. For a fluid element in a two dimensional flow field (x-y plane), if it will undergo [ ]
A) Translation only B) Translation and rotation
C) Translation and deformation D) Deformation only

14. In adiabatic flow with friction, the stagnation temperature along a streamline [ ]
A) Increases B) Decreases C) Remains constant D) None
15. Streamlines, path lines and streak lines are virtually identical for [ ]
A) Uniform flow B) Flow of ideal fluids C) Steady flow D) Non uniform flow
16. Existence of velocity potential implies that [ ]
A) Fluid is in continuum B) Fluid is irrotational C) Fluid is ideal D) Fluid is compressible
17. In a flow field, the streamlines and Equipotential lines [ ]
A) Are Parallel B) Are orthogonal everywhere in the flow field
C) Cut at any angle D) Cut orthogonally except at the stagnation points
18. The flow in pipe is laminar if [ ]
A) Reynolds number is less than 2000 B) Reynolds number is more than 2000
C) Reynolds number is more than 4000 D) None of the above
19. A stream line is a line [ ]
A) Which is along the path of particle B) Which is always parallel to the main flow
C) Across which there is no flow D) None of these
20. Continuity equation can take the form [ ]
A) $A_1V_1=A_2V_2$ B) $Q_1V_1=Q_2V_2$ C) $A_1V_2=A_2V_1$ D) $A_1A_2=V_1V_2$
21. Continuity equation deals with the law of conservation of [ ]
A) Mass B) Momentum C) Energy D) None of the above
22. Which of the following functions represent the velocity potential of a function [ ]
A) $\varphi=X^2+Y^2$ B) $\varphi=X^2-Y^2$ C) $\varphi=2X^2+Y^2$ D) $\varphi=X^3+Y^3$
23. In an immersed body, centre of pressure is [ ]
A) At the centre of gravity B) Above the centre of gravity
C) Below be centre of gravity D) Could be above or below
24. A flow is called super-sonic if the [ ]
A) Velocity of flow is very high B) Discharge is difficult to measure
C) Mach number is between 1 and 6 D) None of these
25. A one dimensional flow is one which [ ]
A) Is uniform flow B) Is steady uniform flow
C) Takes place in straight lines D) Involves zero transverse component of flow
26. Navier Stoke's equation represents the conservation of [ ]
A) Energy B) Mass C) Pressure D) Momentum
27. For incompressible flow the density of fluid is [ ]
A) Constant B) Proportional C) Not constant D) Equal
28. The continuity equation in three dimensions is [ ]
A) $\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial x}$ B) $\frac{\partial V}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial w}{\partial x}$ C) $\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial z}$ D) $\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial x}$
29. For steady flow in velocity potential, the velocity in x-direction is [ ]
A) $u= -\frac{\partial \varphi}{\partial y}$ B) $u= -\frac{\partial \varphi}{\partial x}$ C) $u= -\frac{\partial \varphi}{\partial z}$ D) $u=\frac{\partial \varphi}{\partial y}$
30. For steady flow in stream function, the velocity in x-direction is [ ]
A) $u= -\frac{\partial \Psi}{\partial y}$ B) $u= -\frac{\partial \Psi}{\partial x}$ C) $u= -\frac{\partial \Psi}{\partial z}$ D) $u= \frac{\partial \varphi}{\partial y}$
31. For steady flow in velocity potential, the velocity in y-direction is [ ]
A) $u= -\frac{\partial \varphi}{\partial y}$ B) $u= -\frac{\partial \varphi}{\partial x}$ C) $u= -\frac{\partial \varphi}{\partial z}$ D) $v= -\frac{\partial \varphi}{\partial y}$

32. For steady flow in stream function, the velocity in y-direction is [ ]
A) $v= -\frac{\partial \Psi}{\partial y}$ B) $v= \frac{\partial \Psi}{\partial x}$ C) $u= -\frac{\partial \Psi}{\partial z}$ D) $u= \frac{\partial \varphi}{\partial y}$

33. For Equipotential line, the velocity function is [ ]
A) Constant B) Same C) Reciprocal D) Proportional
34. A grid is obtained by drawing a series of Equipotential line is called [ ]
A) Stream function B) Velocity potential C) Flow net D) Free vortex flow

35. The continuity equation in two dimensions is [ ]
A) $\frac{\partial u}{\partial x}+\frac{\partial w}{\partial z}$ B) $\frac{\partial u}{\partial y}+\frac{\partial w}{\partial x}$ C) $\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}+\frac{\partial w}{\partial z}$ D) $\frac{\partial u}{\partial x}+\frac{\partial v}{\partial y}$
36. The velocity of flow does not change with respect to space is [ ]
A) Steady flow B) Uniform flow C) Unsteady flow D) Laminar flow
37. The fluid particles are flow along stream lines and also rotates about its own axis is [ ]
A) Rotational flow B) Irrotational flow C) Turbulent flow D) Compressible flow
38. The fluid particles are flow along stream lines and not rotates about its own axis is [ ]
A) Rotational flow B) Irrotational flow C) Turbulent flow D) Compressible flow
39. For two dimensional flow, the velocity in z- direction is [ ]
A) Constant B) Unity C) function of z D) Zero
40. Irrotational flow means [ ]
A) The fluid does not rotate while moving B) The fluid particles moves in straight line
C) The net rotation of fluid particles about their mass centre is zero D) None of the above

UNIT –IV

FLOW THROUGH IPES

1. Friction factor for pipes depends on [ ]
A) Rate of flow & density B) Viscosity C) Pipe roughness D) All the above
2. An ideal fluid is [ ]
A) Similarly to the perfect gas B) Frictionless and incompressible
C) Obey Newton's law of viscosity D) Satisfies continuity equation
3. For transition flow, the Reynolds number varies [ ]
A) Less than 2000 B) More than 4000 C) Between 2000 & 4000 D) Less than 4000
4. 12. The pipe bend causing maximum head loss is [ ]
A) 30^0 bend B) 45^0 bend C) 60^0 bend D)90^0 bend
5. For pipes, laminar flow occurs when the Reynolds number is [ ]
A) Less than 2000 B) Between 2000 and 4000 C) More than 2000 D) More than 4000
6. Head loss in turbulent flow in pipe varies directly as the [ ]
A) Square root of velocity B) Velocity C) Square of velocity D) Cube of velocity
7. The loss of pressure head for the laminar flow through pipes varies [ ]
A) As the square of velocity B) Directly as the velocity
C) As the inverse of velocity D) None of the above
8. Hydraulic gradient line for flow in a pipe of constant diameter is [ ]
A) Always above the centre line of the pipe B) Always below the energy grade line
C) Always sloping downwards in the direction of flow D) Coincides with the pipe centre line
9. The head losses in a sudden expansion from 6 cm diameter pipe to 12 cm diameter pipe, in terms of velocity V_1 in the 6 cm pipe is [ ]
A) $\frac{15}{16}\frac{V_1^2}{2g}$ B) $\frac{3}{4}\frac{V_1^2}{2g}$ C) $\frac{1}{4}\frac{V_1^2}{2g}$ D) $\frac{9}{16}\frac{V_1^2}{2g}$
10. In a sudden contraction, the velocity head changes from 0.5m to 1.25m. The coefficient of contraction is 0.66. The head loss in this contraction is [ ]
A) 0.133m B) 0.332m C) 0.644m D) 0.750m

11. The minor loss due to sudden contraction [ ]
A) Flow contraction B) Expansion of flow after contraction
C) Boundary friction D) Cavitation

12. A flow is said to be laminar [ ]
A) The fluid particles are move in zig-zag way B) The Reynolds number is high
C) The fluid particles are move parallel to the layer D) None of the above

13. The frictional head loss in a turbulent flow through a pipe varies [ ]
A) Directly as the average velocity. B) Directly as the square of the average velocity.
C) Inversely as the square of the average velocity. D) Inversely as the square of the internal diameter

14. Two pipes systems can be said to be equivalent, when the quantities same are [ ]
A) Frictionless loss and flow B) Length and diameter C) Flow and length D) Length and flow

15. The Darcy-Weisbach equation for loss of head is [ ]
A) $\frac{4fLV^2}{2gd}$ B) $\frac{fLV^2}{2gd}$ C) $\frac{4LV^2}{2gd}$ D) $\frac{4fLV^2}{2g}$

16. The Chezy's formula is [ ]
A) V=C$\sqrt{m}$ B) V=$\sqrt{mi}$ C) V=C$\sqrt{mi}$ D) V=C$\sqrt{i}$

17. The formula for Reynolds number is [ ]
A) $\frac{Vd}{\mu}$ B) $\frac{\rho d}{\mu}$ C) $\frac{Vd}{\rho}$ D) $\frac{\rho Vd}{\mu}$

18. The loss of head due to sudden enlargement is [ ]
A) $\frac{(V_1-V_2)}{2g}$ B) $\frac{(V_1-V_2)^2}{2g}$ C) $\frac{(V_1-V_2)^2}{2}$ D) $\frac{(V_1-V_2)^2}{g}$

19. The loss of head at the exit of the pipe is [ ]
A) $\frac{0.5\ V^2}{2g}$ B) $\frac{0.1\ V^2}{2g}$ C) $\frac{1.0\ V^2}{2g}$ D) $\frac{0.25\ V^2}{2g}$

20. A pipe has well rounded entrance from a reservoir. If the head loss at the entrance is expressed as $K\frac{V^2}{2g}$, the value of K is [ ]
A) 0.02 B) 0.2 C) 0.5 D) 0.1

21. Minor losses in a pipe flow are those losses [ ]
A) Which are insignificantly small B) Which can be neglected always
C) Caused by local disturbance due to pipe fittings D) Caused by frictional resistance

22. Two identical pipes of length L, Diameter D and friction factor f, are connected in series between two reservoirs. The size of a pipe of a length L and the same friction factor f, equivalent to the above pipe lines [ ]
A) 0.5D B) 0.87D C) 1.15D D) 1.40D

23. Two identical pipes of length L, Diameter D and friction factor f, are connected in parallel between two reservoirs. The size of a pipe of a length L and the same friction factor f, equivalent to the above pipe lines [ ]
A) 0.5D B) 0.87D C) 1.15D D) 1.40D

24. In Darcy's equation for a flow, the friction factor is misadjusted by +25%, the resulting error in the estimated discharge is [ ]
A) +25% B) -16.67% C) -5% D) -12.5%

25. For maximum transaction of power through a pipe line with a total head H, the head loss due to friction h_f is given by [ ]
A) $\frac{H}{3}$ B) $\frac{2}{3}H$ C) $\frac{H}{2}$ D) 0.1H

26. Three pipes are connected in series then [ ]

A) The head loss in each pipe is same B) The Discharge through each pipe is same
C) The total discharge is the sum of the discharges in the individual pipe
D) The Reynolds number for each pipe is same

27. Two reservoirs are connected by two pipes A and B of identical friction factor and length in series. If the diameter of A is 30% larger than that B the ratio of the head loss in A to that in B [ ]
A) 0.77 B) 0.59 C) 0.50 D) 0.27

28. The discharge Q in a pipe of known f is estimated by using the head loss h_f in a length L and diameter D. If an error of 1% is involved in measurement of D, the corresponding error in the estimation of Q [ ]
A) 2.5% B) 1.0% C) 0.4% D) 5%

29. A rectangular conduit 0.8m * 0.4m carries air (kinematic viscosity $1.5*10^{-2}$ m^2/sec) at a velocity of 3m/sec. The Reynolds number of the flow for the calculation of friction factor is [ ]
A) $8*10^4$ B) $1.07*10^5$ C) $1.6*10^5$ D) $6*10^4$

30. Which one of the following is a major loss? [ ]
A) Frictional loss B) Shock loss C) Entry loss D) Exit loss

31. The frictional resistance for fluids in motion is [ ]
A) Dependent on the pressure for both laminar and turbulent flows
B) Independent of the pressure for both laminar and turbulent flows
C) Dependent on the pressure for laminar flow and independent of the pressure for turbulent flow
D) Independent of the pressure for laminar flow and dependent on the pressure for turbulent flow

32. The head loss at the entrance of the pipe is that at its exit [ ]
A) Equal to B) Twice C) Four times D) Half

33. On which of the factors does the co-efficient of bend in a pipe depend? [ ]
A) Angle of bend and radius of curvature of the bend B) Angle of bend and radius of the pipe
C) Radius of curvature of the bend and pipe
D) Radius of curvature of the bend and pipe radius and angle of bend

34. Which property of the fluid accounts for the major losses in pipes? [ ]
A) Density B) Specific gravity C) Viscosity D) Compressibility

35. Minor losses do not make any serious effect in [ ]
A) Short pipes B) Long pipe C) Both the short as well as long pipes D) Cannot say

36. What is the formula for determining the size of equivalent pipe for two pipes of lengths L_1, L_2 and diameters d_1, d_2 respectively? Where, $L = L_1 + L_2$ [ ]
A) $(L / d) = (L_1 / d_1) + (L_2 / d_2)$ B) $(L / d^2) = (L_1 / d_1^2) + (L_2 / d_2^2)$
C) $(L / d^3) = (L_1 / d_1^3) + (L_2 / d_2^3)$ D) $(L / d^5) = (L_1 / d_1^5) + (L_2 / d_2^5)$

37. The highest point of syphon is called as [ ]
A) Syphon top B) Summit C) Reservoir D) one of the above

38. Two identical pipes of length L, Diameter D and friction factor f are connected in parallel between two points. The length of a single pipe of a diameter D and the same friction factor f, equivalent to the above pair is [ ]
A) $\sqrt{2L}$ B) $\frac{L}{2}$ C) $\frac{L}{\sqrt{2}}$ D) $\frac{L}{4}$

39. The loss of head at the entrance of the pipe is [ ]
A) $\frac{0.5\ V^2}{2g}$ B) $\frac{0.1\ V^2}{2g}$ C) $\frac{1.0\ V^2}{2g}$ D) $\frac{0.25\ V^2}{2g}$

40. Flow through branched pipes can be solved by the following equations [ ]
A) Continuity equation B) Bernoulli's equation C) Darcy-Weisbach equation D) All the above

UNIT –III

FLUID DYNAMICS

1. The ratio of area of jet at vena-contract to the area of orifice is [ ]
A) Coefficient of discharge B) Coefficient of velocity
C) Coefficient of contraction D) None of the above
2. The ratio of actual discharge to theoretical discharge is [ ]
A) Coefficient of discharge B) Coefficient of velocity
C) Coefficient of contraction D) None of the above
3. The ratio of actual velocity to theoretical velocity is [ ]
A) Coefficient of discharge B) Coefficient of velocity
C) Coefficient of contraction D) None of the above
4. Orifice as well as mouth pieces are used for measuring [ ]
A) Rate of flow B) Velocity of flow C) Coefficient of velocity D) Coefficient of discharge
5. For a pipe flow, at constant capacity, head is proportional to [ ]
A) 1/d B) $1/d^2$ C) $1/d^4$ D) $1/d^5$
6. The upper surface of the weir over which water flows is known as [ ]
A) Nappe B) Crest C) Sill D) Vein
7. Fire hose nozzle is generally made of [ ]
A) Divergent shape B) Convergent shape C) Cylindrical shape D) Parabolic shape
8. The rise of liquid along the walls of a revolving cylinder as compared to depression at the centre With respect to initial level is [ ]
A) Same B) More C) Less D) Unpredictable
9. Mouth pieces are used to measure [ ]
A) Velocity B) Pressure C) Rate of flow D) Viscosity
10. In submerged orifice flow, the discharge is proportional to which one of following parameters
A) Square root of the downstream head [ ]
B) Square root of the upstream head
C) Square of the upstream head
D) Square root of the difference between upstream and downstream heads
11. If the velocity of flow does not change with respect to length of direction of flow is [ ]
A) Steady flow B) Uniform flow C) Incompressible flow D) Rotational flow
12. The density of flow is constant from point to point in a flow region, it is called [ ]
A) Steady flow B) Incompressible flow C) Uniform flow D) Irrotational flow
13. The rate of flow through a venturimeter varies [ ]
A) H B) $\sqrt{H}$ C) $H^{3/2}$ D) $H^{5/2}$
14. The rate of flow through V-notch varies as [ ]
A) H B) $\sqrt{H}$ C) $H^{3/2}$ D) $H^{5/2}$
15. Notch is a device used for measuring [ ]
A) Rate of flow through pipe B) Rate of flow through small channel
C) Velocity through a pipe D) Velocity through a small channel
16. The discharge through rectangular notch is [ ]
A) $Q=2/3 \times C_d \times L \times H^{5/2}$ B) $Q=2/3 \times C_d \times L \times H^{3/2}$
C) $Q=8/15 \times C_d \times L \times H^{5/2}$ D) $Q=2/3 \times C_d \times L \times H^{3/2}$
17. The discharge through triangular notch is [ ]
A) $Q=2/3 * C_d * \tan\theta/2 * H^{5/2}$ B) $Q=2/3 * C_d * \tan\theta/2 * H^{3/2}$
C) $Q=2/15 * C_d * \tan\theta/2 * \sqrt{2g}\, H^{5/2}$ D) $Q=2/3 * C_d * L * H^{3/2}$

18. The velocity with which the water approaches a notch is called [ ]
A) Velocity of flow B) Velocity of approach C) Velocity of whirl D) None of the above
19. Francis's formula for a rectangular weir for two end contraction suppressed is given by[
A) $Q=1.84.L.H^{5/2}$ B) $Q=2/3.L.H^{3/2}$ C) $Q=1.84.L.H^{3/2}$ D) $Q=2/3.L.H^{5/2}$
20. A triangular notch is more accurate measuring device than the rectangular notch for measuring Which one of the following [ ]
A) Low flow rates B) Medium flow rate C) High flow rates D) All flow rates
21.A standard 90° V-notch weir is used to measure discharge. The discharge is Q_1 for heights H_1 above the sill and Q_2 is the discharge for a height H2– If H_1 / H_2 is 4, then Q_1 / Q_2 is [ ]
A) 32 B) $16\sqrt{2}$ C) 16 D) 18
22. A short tube mouthpiece will not run full at its outlet if the head under which the orifice works, is
A) Equal of 12.2 m of water B) More than 12.2 m of water [ ]
C) Less than 12.2 m of water D) None of the above
23. The thickness of a sharp crested weir is kept less than [ ]
A) Two-third of the height of water on the sill B) One-fourth of the height of water on the sill
C) One-third of the height of water on the sill D) One half of the height of water on the sill
24. The side slope of Cipolletti weir is generally kept [ ]
A) 1 to 3 B) 1 to 4 C) 1 to 5 D) 1 to 2
25. The theoretical discharge through orifice is [ ]
A) Area of orifice x $\sqrt{2gh}$ B) Area of orifice x $\sqrt{2h}$

C) Area of orifice x $\sqrt{gh}$ D) Area of orifice x $\sqrt{2gh}$

26. For external mouth pieces, absolute pressure head at ena-contracta is [ ]
A) $H_c=H_a- H$ B) $H_c=H_a-0.49\ H$ C) $H_c=H_a-0.89$ D) $H_c=H_a-0.89\ H$
27. The discharge through fully submerged orifice is [ ]
A) $Q = C_d * b * (H_2-H_1) * \sqrt{gh}$ B) $Q = C_d * (H_2-H_1) * \sqrt{2gh}$

C) $Q = C_d * b * (H_2-H_1) * \sqrt{2gh}$ D) $Q = b * (H_2-H_1) * \sqrt{2gh}$

28. The condition height for maximum discharge over a broad-crested weir is [ ]
A) h=2/3.H B) h=1/3.H C) h=4/3.H D) h=2.H
29. The error in discharge due to the error in the measurement of head over a rectangular notch is
A) 1/2 dH/H B) 3/2 dH/H C) 3/2 dH D) 3/4 dH/H [ ]
30. The condition for maximum discharge over a broad-crested weir is [ ]
A) $Q_{max.}= 1.705\ C_d\ H^{3/2}$ B) $Q_{max.}= 1.905\ C_d\ L\ H^{3/2}$
C) $Q_{max.}= 1.705\ L\ H^{3/2}$ D) $Q_{max.}= 1.705\ C_d\ L\ H^{3/2}$
31. The fluid property, due to which, mercury does not wet the glass is [ ]
A) Surface tension B) Cohesion C) Adhesion D) Viscosity
32. The dimensions for discharge is [ ]
A) L^3 B) L^3T^{-2} C) L^3T^{-1} D) ML^2T^{-1}
33. In a forced vortex, the velocity of fluid anywhere within fluid is [ ]
A) Maximum B) Minimum C) Zero D) Unpredictable
34. Hydrometer is used to measure [ ]
A) Specific gravity of liquids B) Specific gravity of solids
C) Specific gravity of gasses D) None of the above
35. The head due to velocity approach is given by [ ]
A) $h_a=V_a/2g$ B) $h_a=V_a^2/2g$ C) $h_a=V_a/2g$ D) $h_a=V_a^2/g$

36. The coefficient of discharge for external mouth piece is [ ]
A) 0.375 B) 0.5 C) 0.707 D) 0.855
37. The velocity corresponding to Reynold number of 2800, is called [ ]
A) sub-sonic velocity B) super-sonic velocity
C) lower critical velocity D) higher critical velocity
38. The atmospheric pressure at sea level is [ ]
A) 103 kN/m^2 B) 10.3 m of water C) 760 mm of mercury D) all of these
39. The error in discharge (dQ/Q) to the error in measurement of head (dH/H) over a rectangular notch is given by [ ]
A) $\frac{dQ}{Q} = \frac{1}{2} \times \frac{dH}{H}$ B) $\frac{dQ}{Q} = \frac{3}{4} \times \frac{dH}{H}$ C) $\frac{dQ}{Q} = \frac{dH}{H}$ D) $\frac{dQ}{Q} = \frac{3}{2} \times \frac{dH}{H}$
40. The discharge over a triangular notch is [ ]
A) inversely proportional to $H^{3/2}$ B) directly proportional to $H^{3/2}$
C) inversely proportional to $H^{5/2}$ D) directly proportional to $H^{5/2}$

UNIT –V

LAMINAR FLOWAND TURBULENT FLOW

1. A flow is said to be laminar [ ]
A) The fluid particles are move in zig-zag way B) The Reynolds number is high
C) The fluid particles are move parallel to the layer D) None of the above
2. For a laminar flow through a circular pipes [ ]
A) The maximum velocity = 1.5 times of average velocity
B) The maximum velocity = 2.0 time the average velocity
C) The maximum velocity = 2.0 time the average velocity D) None of the above
3. The loss of pressure head for the laminar flow through pipes varies [ ]
A) As the square of velocity B) Directly as the velocity
C) As the inverse of velocity D) None of the above
4. For the laminar flow through a pipe, the shear stress over the cross-section [ ]
A) Varies inversely as the distance from the centre of pipe
B) Varies directly as the distance from the surface of pipe
C) Varies directly as the distance from the centre of the pipe
D) Remains constant over the cross-section
5. The velocity distribution in laminar flow through a circular pipe follow the [ ]
A) Parabolic law B) Linear law C) Logarithmic law D) None of the above
6. Steel and Cast Iron pipes carrying a fluid under pressure are regarded as hydraulically [ ] smooth when
A) The boundary surface is relatively smooth B) The roughness projections are of flow height
C) The roughness elements are completely covered by the laminar sub-layer
D) The laminar is thin as compared to the average height of roughness elements
7. In laminar flow [ ]
A) Experiment is required for the simplest flow case B) Newton's law of viscosity is applied
C) Flow particles move in irregular path D) Viscosity of unimportant
8. If x is the distance from leading edge, then the boundary layer thickness in laminar flow varies as
A) x B) x C) x D) x/7 [ ]

9. The depth ‘d’ below the free surface at which the point velocity is equal to the average velocity of flow for a uniform laminar flow with a free surface, will be [ ]
A) 0.423 D B) 0.577 D C) 0.223 D D) 0.707 D
10. The boundary layer thickness in turbulent flow varies as [ ]
A) x”7 B) x,/2 C) x4/5 D) x3/5
where x is the distance from leading edge
11. The distance y from pipe boundary, at which the point velocity is equal to average velocity for turbulent flow, is [ ]
A) 0.223 R B) 0.423 R C) 0.577 R D) 0.707 R
12. In laminar flow through a round tube, the discharge varies [ ]
A) Linearly as the viscosity B) Inversely as the pressure drop
C) Linearly as the cube of the diameter D) Inversely as the viscosity
13. The pressure drop in a pipe flow is directly proportional to the mean velocity. It can be deduced that the [ ]
A) Flow is laminar B) Flow is turbulent C) Pipe is smooth D) Pipe is rough
14. In pipe larger than 25 mm, carrying water, the laminar flow is [ ]
A) Very often exist B) Generally exist C) Rarely exist D) Unpredictable
15. The Boundary layer takes place [ ]
A) For Ideal Fluid B) For pipe flows only C) For Real fluid D) For flow over flat plates
16. The Existence of Boundary layer on account of [ ]
A) Fluid Velocity B) Gravitational velocity C) Fluid viscosity D) surface Tension
17. In case of an airfoil, the separation of flow occurs [ ]
A) At the extreme rear of body B) At the extreme front of body
C) Midway between rear and front of body
D) Anywhere between rear and front of body depending upon Reynolds number

18. For laminar flow in a pipe of circular cross-section, the Darcy’s friction factor f is [ ]
A) directly proportional to Reynolds number and independent of pipe wall roughness
B) directly proportional to pipe wall roughness and independent of Reynolds number
C) inversely proportional to Reynolds number and indpendent of pipe wall roughness
D) inversely proportional to Reynolds number and directly proportional to pipe wall roughness
19. Separation of flow occurs when [ ]
A) The pressure intensity reaches a minimum B) The cross-section of a channel is reduced
C) The boundary layer comes to rest D) All of the above
20. The ratio of average velocity to maximum velocity for steady laminar flow in circular pipes is
A) 1/2 B) 2/3 C) 3/2 D) 2 [ ]
21. The distance from pipe boundary, at which the turbulent shear stress is one-third die wall shear stress, is [ ]
A) 1/2 R B) 2/3 R C) 3/4R D) 1/3 R
22. The discharge of a liquid of kinematic viscosity 4 cm2/sec through a 8 cm dia-meter pipe is 3200n cm/sec. The type of flow expected is [ ]
A) Laminar flow B) Transition flow C) Turbulent flow D) Not predictable from the given data
23. The velocity distribution for laminar flow through a circular tube [ ]
A) Is constant over the cross-section B) Varies linearly from zero at walls to maximum at centre
C) Varies parabolically with maximum at the centre D) None of the above
24. A fluid of kinematic viscosity 0.4 cm^2/sec flows through a 8 cm diameter pipe. The maximum velocity for laminar flow will be [ ]
A) Less than 1 m/sec B) 1 m/sec C) 1.5 m/sec D) 2 m/sec

25. The maximum thickness of boundary layer in a pipe of radius r is [ ]
A) r B) r/2 C) 0 D) 2r
26. The boundary layer thickness at a distance of l m from the leading edge of a flat plate, kept at zero angle of incidence to the flow direction, is O.l cm. The velocity outside the boundary layer is 25 ml sec. The boundary layer thickness at a distance of 4 m is (Assume that boundary layer is entirely laminar.) [ ]
A) 0.40 cm B) 0.20 cm C) 0.10 cm D) 0.05 cm
27. For laminar flow in circular pipes, the Darcy's friction factor f is equal to [ ]
A) 16/Re B) 32/ Re C) 64/ Re D) none of the above
28. The kinematic energy correction factor ß for a laminar flow through a circular pipe is [ ]
A) 1.5 B) 2.0 C) 1.67 D) 1.33
29. An oil of kinematic viscosity 0.25 stokes flows through a pipe of diameter 10 cm. The flow is a critical at a velocity of [ ]
A) 7.2m/s B) 5. m/s C) 0.5m/s D) 0.72m/s
30. Which of the following assumptions is/are correct to obtain an analytical solution for the problem on laminar boundary layer of fluid on flat plate? [ ]
A) The fluid is incompressible B) The fluid is in steady-state C) The is not affected by fluid flow D) All of the above
31.The momentum correction factor ß for a laminar flow through a circular pipe is [ ]
A) 1.5 B) 2.0 C) 1.67 D) 1.33
32. The equation of motion for a laminar flow of a real fluid is [ ]
A) Euler's equation B) Bernoulli's equation C) Navier stoke equation D) Hagen equation
33. In a uniform laminar flow through a two dimensional passage, the ratio of maximum velocity to average velocity is [ ]
A) 1.5 B) 2.0 C) 1.67 D) 1.33
34. The creeping motion obeys stokes law up to a critical Reynolds number value of [ ]
A) 0.001 B) 1.0 C) 100 D) 2000
35. In Laminar flow between two fixed parallel plate, the shear stress is [ ]
A) Constant across the passage B) Zero all through the passage
C) Maximum at centre and zero at the boundary D) Maximum at boundary and zero at the centre
36. The separation of boundary layer takes place [ ]
A) Negative B) Positive C) Zero D) Constant
37. At the point of separation [ ]
A) Velocity is negative B) Shear stress is zero C) Shear stress is maximum D) none
38. The separation of boundary layer occurs when [ ]
A) The flow is accelerated fast boundary B) The boundary layer comes to rest
C) Any adverse pressure is encountered D) The fluid is ideal
39. The ratio of coefficient of friction drag in laminar boundary layer compared to that in turbulent boundary layer is proportional to [ ]

A) $R_L^{\frac{1}{2}}$ B) $R_L^{\frac{1}{5}}$ C) $R_L^{\frac{1}{10}}$ D) $R_L^{\frac{3}{10}}$

40. If the velocity u in a turbulent boundary layer varies as $y^{\frac{1}{7}}$, the growth of the boundary layer thickness varies δ/x varies as [ ]

A) $Re_x^{\frac{-1}{5}}$ B) $Re_x^{\frac{-1}{2}}$ C) $Re_x^{\frac{-4}{5}}$ D) Re_x^{-1}

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