FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI
DEPARTMENT OF MECHANICAL ENGINEERING
2012/2013 HARMATTAN SEMESTER EXAMINATION
COURSE: ENG 300 – FLUID MECHANICS TIME: 2 hours

INSTRUCTIONS: (1). ANSWER ALL QUESTIONS. (2) SHADE "A" FOR "TRUE" AND "B" FOR "FALSE". (3) FOR ANSWERS THAT ARE NOT PROVIDED, WRITE THE ANSWERS IN WORDS.

SECTION A

1) The pressure ..... as the depth of the liquid increases (a) increase (b)decrease (c) remain unchanged (d) none of the above
2) The height of the free surface above any point is known as (a) static head (b) intensity of pressure (c) pressure head (d) none of the above
3) Any pressure measured above the absolute zero of pressure is termed as (a) atmospheric pressure (b) gauge pressure (c) absolute pressure (d) none of the above
4) The fundamental S.I. unit of pressure is N/m^2; this is also known as (a) Pascal (b) stoke (c) poise (d) none of the above
5) Calculate the force required to cause a plate of area $0.1m^2$ to slide on a surface at a speed of $1mms^{-1}$. The plate is separated from the surface by a film of oil $10^{-3}m$ thick whose coefficient of viscosity is $1.5Nsm^{-2}$. (a) 5N (b) 15N (c) 18N (d) 25N
6) The Reynolds number is the ratio of ..... forces to viscous forces. (a) inertia (b) buoyancy (c) shear (d) tangential
7) Bulk modulus is the ratio of differential pressure to percentage decrease in (a) volume (b) temperature (c) entropy (d) elasticity
8) A fluid is said to be compressible when it's ..... is not constant (a) density (b) density (c) shear force (d) volume
9) An Ideal fluid is one which is devoid of (a) friction (b) flow (c) acceleration (d) matter
10) Mach number is the ratio of the velocity of flow to ..... (a) sonic speed (b) acceleration (c) height (d) volume
11) The weight of a substance in air is different from its weight in water due to ..... (a) buoyancy (b) compressibility (c) reaction (d) shear
12) Turbulent flow occurs when the Reynolds number becomes greater than (a) 2,100 (b) 760 (c) 35,000 (d) 14.7
13) If fluid A has a higher density than fluid B, then, the kinematic viscosity of A is higher than that of fluid B (a) yes (b) No (c) more information required (d) none of these
14) When temperature is increased, the density of a fluid ..... (a) increases (b) decreases (c) does not change (d) reverses
15) Heat loss during fluid flow is the same as loss of ..... (a) volume (b) energy (c) heat (d) symmetry
16) During the flow of a fluid in a horizontal conduit when velocity increases the ..... decreases (a) angular velocity (b) pressure (c) viscosity (d) kinematic viscosity
17) For a liquid of density of $835kg/cm^3$, obtain the specific weight. (a) $8.20KN/m^3$ (b) $10.2KN/m^3$ (c) $7.0KN/m^3$ (d) $15KN/m^3$
18) At what pressure will air at 49^oC weigh $18.7N/m^3$ (a) 176KPa (b) 245KPa (c) 167KPa (d) 671KPa.
19) What force is necessary to lift a thin wire ring 45mm in diameter from a water surface at 20^oC? Neglect the weight of the wire (a)0.0806N (b) 0.0206N (c) 52.36N (d) 5.236N
20) What pressure must be applied to water to reduce its volume by 1.25% if the bulk modulus of elasticity is 2.19GPa (a) 0.274GPa (b)0.00274GPa (c) 0.0274GPa (d) 0.724GPa

SECTION B

21) A pipe is described as an open channel, when it is ... filled with fluid. (a) partially (b) completely (c) over
22) Friction in an open channel is best calculated using an equation called; ..... (a) Darcy – Weisbach formula (b) Chezy's formula (c) Bernoulli's equation
23) Darcy – Weisbach equation is used to calculate loss of head due to ..... (a) sudden enlargement (b) surface roughness (c) none of the above
24) Loss of head at exit of a pipe is given as: (a) $\frac{V}{2g}$ (b) $\frac{V^2}{g}$ (c) $\frac{V^2}{2g}$
25) There is specific relationship between the slope of the Energy Gradient Line and the slope of the axis of the pipe (a) true (b) false
26) The energy loss in a pipeline is due to: (a) surface roughness only (b) viscous action only (c) friction offered by pipe wall as well as by viscous function
27) The Energy Gradient Line (E.G.L) always drops in the direction of flow because of: (a) flow rate (b) pressure changes (c) loss of head
28) Which of the following statement is false: (a) Hydraulic Gradient Line (H.G.L) may rise or fall depending on the loss of head (b) The slope of H.G.L can be equal to the slope of E.G.L (c) none of the above
29) Which of the following statement is true: (a) the sum of potential head and the velocity head at any point is called the piezometric head (b) the vertical intercept between the H.G.L and E.G.L is equal to velocity head (c) all of the above
30) Water hammer is caused due to: (a) sudden partial opening of a valve in a pipeline (b) sudden closure of a valve in pipe flow (c) incompressibility of fluid
31) Which of the following statement is false about Water hammer in pipes: (a) the head pressure is proportional to time required to close the valve (b) the assumption that liquid is incompressible is incorrect (c) none of the above
32) Dupit's equation for an equivalent pipe is given as: (a) $\frac{L}{D^5} = \left|\frac{L_1}{D_1^5} + \frac{L_2}{D_2^5} + \frac{L_3}{D_3^5} + \right|$ (b) $\frac{L}{D^4} = \left|\frac{L_1}{D_1^4} + \frac{L_2}{D_2^4} + \frac{L_3}{D_3^4} + \right|$ (c) none of the above
33) Which of the following is true for fluid flow in parallel pipes: (a) rate of discharge in the main line equals the sum of the discharges in each of the parallel pipes (b) the loss of head in each pipe is same (c) all of the above

42. Velocity of a flowing fluid through a pipe at the solid fluid interface is
A. zero B. <1 C. >1.
43. In uniform flow, the velocity of fluid at a given instant at any point is different
A. True B. False
44. In unsteady state uniform flow, velocity of a flowing fluid is the same at every point but does not change with time.
A True B False
45. In steady state uniform flow, velocity of a flowing fluid is the same at every point but does not change with time.
A. True B. False
46. A boundary layer is part of a moving fluid in which the fluid motion is influenced by the presence of a solid boundary.
A. True B. False
47. Cavitation occurs due to formation and collapse of bubbles in pumps
A. True B. False
48. Shear rate unit is
A. sec B. sec^{-1} C. sec^{-2} D. sec^{2}.
49. Cavitation causes abnormal sound and vibration in pumps.
A. True B. False
50. Velocity of a real fluid flowing in a pipe is the same at every point of the cross section
A. True B. False
51. Shear rate is
A. velocity gradient B. acceleration gradient C. none of the above.
52. Shear stress is the force in the flowing fluid which
A. opposes flow B. supports flow C. is static .
53. Viscosity is the ratio of the
A. shear stress to shear rate B. shear rate to shear stress C.
54. Control volume is used for closed system analysis
A. True B. False.
55. Power input of a pump is power output multiplied by efficiency.
A. True B. False
56. In orifice meter, actual gas flow rate is obtained as the product of theoretical flow rate and orifice coefficient.
A. True B. False
57 Acceleration due to movement of the fluid particle from one point to another point at which the velocity at the given instant is different is called
A. convective acceleration B. local acceleration.
58. Acceleration due to change of velocity at every point with time is called
A. convective acceleration B. local acceleration.
59. $V^2/2g$ in the energy equation is called
A. mechanical kinetic energy B. pressure energy C. dynamic energy D. none of the above.
60. Potential flow is flow of an ideal fluid which is
A. incompressible and has zero viscosity B. compressible and has zero viscosity C. incompressible D. compressible.

FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI
DEPARTMENT OF MECHANICAL ENGINEERING
HARMATTAN SEMESTER EXAMINATIONS 2013/2014 SESSION

YEAR: 3 DATE: 23:05:14
COURSE: ENG 309 FLUID MECHANICS I TIME: 3HOURS

INSTRUCTIONS TO CANDIDATES
ANSWER ALL QUESTIONS.

SECTION A

1. What diameter of pipe is required to carry 2.63 m^3/s of fluid when the velocity is 3 m/s.
   A. 1m B. 2.5 m C. 0.85 m D. 3.2 m
2. The pressure at an underwater depth of 10.27 meters is 2 bar. At what depth would the pressure be 4 bar?
   A. 20.54 m B. 30,81 m C. 41.08 m D. 16.34 m
3. A submarine has a 0.5 m circular radio hatch. Calculate the pressure in Pascals, exerted on it at 300 m depth, if the density is 1030 kg/m^3
   A. 3,03 106 B. 43,543 C. 5,432, 753 D. 1,009,432
4. Calculate the pressure in GPa, to be applied to water to reduce its volume by 1.25% if the bulk modulus of elasticity is 2.19 GPa.
   A 15.3 B. 0.065 C. 0.00274 D. 2.34
5. A wooden boat with a density of 480 kg/m^3 is floating in a vat of oil whose density is 800 kg/m^3. What percentage of the boat is floating above the surface of the oil?
   A. 42.% B. 52 % C. 60 % D. 40 %
6. A 150 mm pipe carries 0.0813 m^3 of water. The pipe branches into two pipes, one 50 mm in diameter and the other 100 mm in diameter. If the velocity in the 50 mm pipe is 12.2 m/s, what is the velocity in the 100 mm pipe?
   A. 6.7 m/s B. 7.32 m/s C. 9.4 m/s D. 0.83 m/s
7. A dam has a water depth of h which produces a force F on the dam face. If the water depth doubles to $2h$, the hydrostatic force on the dam face will be
   A. 0.25F B. 0.5 F C. F D. 4F
8. Determine the depression of the meniscus when a tube 2 mm in diameter is immersed in an open bath of mercury. Assume $\sigma = 480\ MN/m$ and an angle of 45°.
   A. 50 mm B. 37 mm C. 109 mm D. 86 mm
9. An aircraft flies at an altitude of 10,000 m where the pressure and density are 0.265 bar and 0.41 kg/m^3 respectively. Determine the aircraft speed for a Mach number of 1.7 when $\gamma = 1.4$.
   A. 1000 m/s B. 511 m/s C. 907 m/s D. 676 m/s
10. The liquid in a piezometer stands 1.5 m above a point A in a pipeline. What is the pressure in kN/m^2 at A, when the liquid is water?
    A. 115 B. 67 C. 14.7 D. 102

SECTION II

In a pipe of 500 mm diameter and 2500 m length, provided with a valve at its end, water is flowing with a velocity of 1.5 m/s. Assuming velocity of pressure wave = 1460 m/s, find:

11. The rise in pressure if the valve is closed in 25 seconds
    A. 120 KN/ m^2 B. 146 KN/ m^2 C. 150 KN/ m^2 D. 166 KN/ m^2

12. The rise in pressure if the valve is closed in 2 seconds. Assume the pipe to be rigid one and take bulk modulus of water as 1.962 GN/m^2
A. 1120 KN/m^2 B. 2101 KN/m^2 C. 1150 KN/m^2 D. 2161 KN/m^2

13. In a turbulent flow, Reynold's number is
A. Less than 4000 B. More than 4000 C. Between 2000 and 4000 D. None of the above

14. Under which of the following conditions the closure of valve is considered rapid
A. The duration of valve closure is greater than $\frac{2L}{C}$ B. The duration of valve closure is less than $\frac{2L}{C}$ C. The duration of valve closure is less than $\frac{L}{C}$ D. None of the above

15. Due to which of the following phenomena is water hammer caused
A. Incompressibility of fluid B. Sudden opening of a valve in a pipeline C. The material of the pipe being elastic D. Sudden closure (partial or complete) of a valve in pipe flow

Three pipes of diameters 300 mm, 200 mm and 400 mm and lengths 300 m, 170 m and 210 m respectively are connected in series. The difference in water surface levels in two tanks is 12 m.

16. Determine the rate of flow if coefficients of frictions are 0.005, 0.0052 and 0.0048 respectively, considering minor losses
A. 0.9945 m^3/s B. 1.945 m^3/s C. 1.205 m^3/s D. 0.4505m^3/s

17. Determine the rate of flow if coefficients of frictions are 0.005, 0.0052 and 0.0048 respectively, neglecting minor losses
A. 0.1905 m^3/s B. 0.945 m^3/s C. 1.205 m^3/s D. 0.1021m^3/s

18. There is ..... between the slope of the energy gradient line and the slope of the axis of the pipe.
A. Specific relation B. No relation C. Linear relation D. Cannot say

19. In case of a laminar flow, the loss of pressure head is
A. Proportional to velocity B. Proportional to (velocity)^2 C. Proportional to (velocity)$^{1/2}$ D. None of the above

20. A pipe behaves like an open channel, when it is .....
A. Partially filled B. Completely filled C. Either partially or completely filled D. Exposed to the atmosphere

A main divides into two parallel pipes, A and B, which again forms one pipe. The length and diameter for the first parallel pipe are 2000 m and 1.0 m respectively, while the length and diameter of the second pipe are 2000 m and 0.8 m respectively. If the total flow in main is 3 m^3/s and the co-efficient of friction for each parallel pipe is same and equal to 0.005;

21. Find the rate of flow in parallel pipe, 'A'
A. 1.2943 m^3/s B. 1.094 m^3/s C. 2.506 m^3/s D. 1.906m^3/s

22. Find the rate of flow in parallel pipe, 'B'
A. 2.506 m^3/s B. 1.906 m^3/s C. 1.094m^3/s D. 1.2943 m^3/s

23. In case of a parallel pipes; which of these is correct
A. The loss of head in each pipe is same B. The rate of discharge in the main line = sum of the discharges in each of the parallel pipes C. All of the above D. None of the above

24. The condition for maximum transmission of power through a pipeline is that one-third of the available must be consumed in friction. The corresponding efficiency of the pipeline is
A. 3% B. 33.3% C. 66.6% D. 97%

In a pipe of 300 mm diameter and 800 m length an oil of specific gravity 0.8 is flowing at the rate of 0.45 m^3/s; take kinematic viscosity of oil as 0.3 stroke. Find:

25. The velocity of flow
A. 6.366 m/s B. 4.556 m/s C. 8.112 m/s D. 5.636 m/s

26. The Reynolds number is
A. 6.366×10^4 B. 4.556×10^4 m/s C. 8.112×10^4 m/s D. 5.636×10^4 m/s

27. Co-efficient of Friction
A. 0.00173 B. 0.00336 C. 0.00381 D. 0.00498

28. Head lost due to friction
A. 111.65m B. 88.97m C. 129.54m D. 109.72 m

29. Power required to maintain the flow
A. 287.48 kW B. 387.48 kW C. 484.36 kW D. 394.99 kW

Two reservoirs are connected by a pipeline consisting of two pipes, one of 15 cm diameter and length 6 m and the other of diameter 22.5 cm and 16 m length. If the difference of water levels in the two reservoirs is 6m, take $f = 0.04$. Calculate:

30. Calculate the velocity head
A. 0.6208 m^3/s B. 0.9401 m^3/s C. 0.5006 m^3/s D. 0.9006 m^3/s

31. Head loss due to sudden enlargement and exit of the pipe
A. $h_e = 0.192m$, $h_0 = 1.222m$ B. $h_e = 1.197m$, $h_0 = 1.396m$
C. $h_e = 1.973m$, $h_0 = 1.396m$ D. $h_e = 1.973m$, $h_0 = 1.197m$

32. Head loss due to friction in each of the pipes
A. $hf_1 = 6.4m$, $hf_2 = 2.25m$ B. $hf_1 = 3.308m$, $hf_2 = 1.396m$
C. $hf_1 = 3.973m$, $hf_2 = 1.396m$ D. $hf_1 = 3.973m$, $hf_2 = 1.197m$

33. Calculate the discharge
A. 0.0294 m^3/s B. 0.094 m^3/s C. 0.0506 m^3/s D. 0.0617 m^3/s

34 The energy loss in a pipeline is due to
A. Surface roughness only B. Viscous action only C. Friction offered by pipe wall as well as by viscous function D. None of the above

35 In a pipe flow the minor losses are those
A. Which depend on the length of the pipeline B. Caused by friction and are thus also called friction losses C. Which have a small magnitude D. Which are caused on account of total disturbance produced by such fittings as valves, bends, etc

36. Power of a stream of fluid is
A. rate of energy transfer B weight per unit time C energy per unit weight D none of the above.

37. Laminar flow is the flow regime when fluids flow at
A low velocities B high velocities C low velocities with lateral mixing D low velocities without lateral mixing.

38. Why does a duck float?
A. It weighs less than water B. It has feathers C. It can swim D. It has lower density than water

39. For compressible fluids, mach number >1 characterises
A. Sonic flow B supersonic flow C subsonic flow D hypersonic flow

40. The fluid property, due to which mercury does not wet glass is
A. surface tension B. viscosity C. cohesion D. Adhesion

41. Reynold's number is used to characterize flow in incompressible fluids.
A. True B. False

42. Velocity of a flowing fluid through a pipe at the solid fluid interface is
A. zero B. < 1 C. > 1.
43. In uniform flow, the velocity of fluid at a given instant at any point is different
A. True B. False
44. In unsteady state uniform flow, velocity of a flowing fluid is the same at every point but does not change with time.
A True B False
45. In steady state uniform flow, velocity of a flowing fluid is the same at every point but does not change with time.
A. True B. False
46. A boundary layer is part of a moving fluid in which the fluid motion is influenced by the presence of a solid boundary.
A. True B. False
47. Cavitation occurs due to formation and collapse of bubbles in pumps
A. True B. False
48. Shear rate unit is
A. sec B. sec^{-1} C. sec^{-2} D. sec^{2}.
49. Cavitation causes abnormal sound and vibration in pumps.
A. True B. False
50. Velocity of a real fluid flowing in a pipe is the same at every point of the cross section
A. True B. False
51. Shear rate is
A. velocity gradient B. acceleration gradient C. none of the above.
52. Shear stress is the force in the flowing fluid which
A. opposes flow B. supports flow C. is static.
53. Viscosity is the ratio of the
A. shear stress to shear rate B. shear rate to shear stress C.
54. Control volume is used for closed system analysis
A. True B. False.
55. Power input of a pump is power output multiplied by efficiency.
A. True B. False
56. In orifice meter, actual gas flow rate is obtained as the product of theoretical flow rate and orifice coefficient.
A. True B. False
57 Acceleration due to movement of the fluid particle from one point to another point at which the velocity at the given instant is different is called
A. convective acceleration B. local acceleration.
58. Acceleration due to change of velocity at every point with time is called
A. convective acceleration B. local acceleration.
59. $V^2/2g$ in the energy equation is called
A. mechanical kinetic energy B. pressure energy C. dynamic energy D. none of the above.
60. Potential flow is flow of an ideal fluid which is
A. incompressible and has zero viscosity B. compressible and has zero viscosity C. incompressible D. compressible.

2014/2015

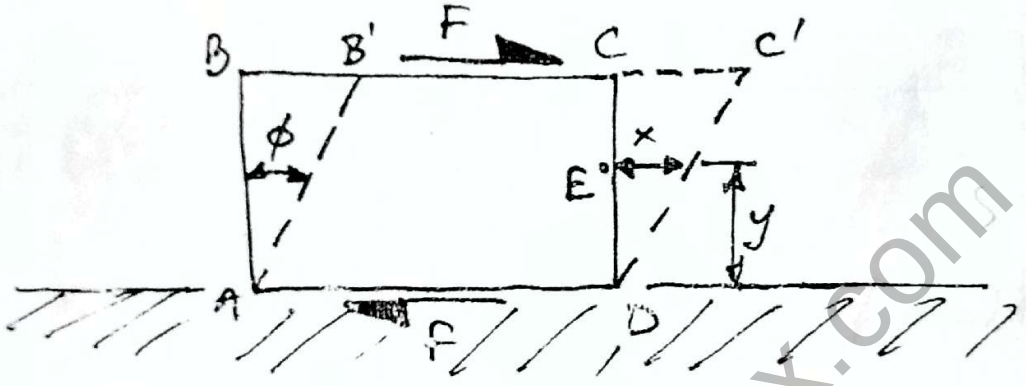
FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI
DEPARTMENT OF MECHANICAL ENGINEERING
HARMATTAN SEMESTER EXAMINATIONS 2014/2015 SESSION

YEAR: 3 **DATE: 24:04:15**
COURSE: ENG 309 FLUID MECHANICS I **TIME: 3HOURS**

INSTRUCTIONS TO CANDIDATES
ANSWER ALL QUESTIONS.

SECTION A

1. The diagram below shows a fluid element ABCD under the action of shearing forces. What does the angle Ø depict?



(a) Measure of shear strain (b) Measure of shear stress (c) a and b (d) constant of proportionality.

2. What is the major difference between a solid and fluid in terms of the angle Ø?
(a) It increases for solids and remains fixed for fluids (b) It is constant in both solids and fluids (c) It is fixed for solids but varies for fluids (d) none of the above.

Shown below is a fluid flowing over a fixed solid boundary. Use it to answer questions 3 and 4.

3. The fluid adjacent to the boundary
(a) adheres to the boundary and has the highest velocity (b) adheres to the boundary and moves at a fairly higher velocity than that of the boundary (c) adheres to the boundary and moves at the same velocity with the boundary (d) all of the above.

4. As y increases, what do you think would happen to the successive layers of fluid parallel to the boundary?
(a) The layers will move with different but decreasing velocities (b) The layers will move with different but increasing velocities (c) The layers will maintain a uniform velocity (d) The layers will maintain the conditions at the boundary

5. In the consideration of fluids as a continuum, the Knudsen number (Kn) plays a significant role. This non-dimensionless parameter is given as
(a) the ratio of mean free path of the fluid molecules to the kinematic viscosity of the fluid (b) the ratio of the mean free path of the molecules to the pressure of the fluid (c) the ratio of the mean free path of the molecules of the fluid to the characteristic length scale of observation (d) the ratio of the mean free path to the rare faction effect of the molecules

6. At what value of Kn should we conveniently uphold the continuum assumption in the treatment of fluids?

(a) $Kn \leq 0.001$ (b) $0.001 \leq Kn \leq 0.1$ (c) $Kn = 0.1$ (d) $Kn > 10$

If $6m^3$ of oil weighs 47kN, calculate:

7. the specific weight of the oil.....7833.3.....

8. the density of the oil.....7833.3.....

9. the relative density of the oil.....

10. A 100m deep stream of water is flowing over a boundary. It is considered to have zero velocity at the boundary and 1.5m/s at the free surface. Assuming a linear velocity profile, what is the shear stress.....? Take the dynamic viscosity of oil to be $1.3x10^{-3}$ N-s/m^2.

$D = \frac{m}{V}$ $\frac{47 \times 1000}{6} =$

Vol = 7833.3

$\rho = m^{mg}$

$\delta = \frac{f}{A}$ $\frac{Ns}{m^2}$

SECTION B

11 .Power of a stream of fluid is

(a) rate of energy transfer (b) weight per unit time (c) energy per unit weight (d)none of the above.

12. Laminar flow is the flow regime when fluids flow at

(a) low velocities (b) high velocities (c) low velocities with lateral mixing (d) low velocities without lateral mixing.

13. Turbulent flow is the flow regime when fluids flow at

(a) high velocities (b) low velocities (c) low velocities with lateral mixing (d) high velocities with lateral mixing.

14. For compressible fluids, mach number >1 characterizes

(a) Sonic flow (b) supersonic flow (c)subsonic flow

15. For compressible fluids mach number < 1 characterizes

(a)sonic flow (b)supersonic flow (c)subsonic flow

16. Reynold's number is used to characterize flow in incompressible fluids.

(a) True (b) False

17. Velocity of a flowing fluid through a pipe at the solid fluid interface is

(a) zero (b)< 1 (c) > 1.

18. In uniform flow, the velocity of fluid at a given instant at any point is different

(a) True (b) False

19. In unsteady state uniform flow, velocity of a flowing fluid is the same at every point but does not change with time. (a) True (b) False

20. In steady state uniform flow, velocity of a flowing fluid is the same at every point but does not change with time. (a) True (b) False

21. A boundary layer is part of a moving fluid in which the fluid motion is influenced by the presence of a solid boundary. (a) True (b) False

22. Cavitation occurs due to formation and collapse of bubbles in pumps. (a) True (b) False

23 .Shear rate unit is (a)sec (b)sec^{-1} (c)sec^{-2} (d) sec^2.

Major ⇒ friction ⇒ Darcy – weisbach formula (ii) chezy's formula

Minor ⇒ Sudden enlargement of the pipe

⇒ Sudden contraction of the pipe

⇒ Bend

$hF = \frac{4FLV^2}{2gD}$

$f = \frac{16}{}$

24. Cavitation causes abnormal sound and vibration in pumps. (a) True (b) False
25. Velocity of a real fluid flowing in a pipe is the same at every point of the cross section.
(a) True (b) False
26. Shear rate is (a)velocity gradient (b)acceleration gradient (c)none of the above.
27. Shear stress is the force in the flowing fluid which (a)opposes flow (b)supports flow (c) is static
28. Viscosity is the ratio of the (a) shear stress to shear rate (b)shear rate to shear stress(c).
29. Control volume is used for closed system analysis (a)True (b) False.
30. Power input of a pump is power output multiplied by efficiency. (a) True (b) False
31.In orifice meter, actual gas flow rate is obtained as the product of theoretical flow rate and orifice coefficient. (a) True (b) False
32 Acceleration due to movement of the fluid particle from one point to another point at which the velocity at the given instant is different is called (a)convective acceleration (b)local acceleration.
33.Acceleration due to change of velocity at every point with time is called
(a)convective acceleration (b) local acceleration.
34. $V^2/2g$ in energy equation is called (a) mechanical kinetic energy (b)pressure energy(c) dynamic energy (d)none of the above.
35. Potential flow is flow of an ideal fluid which is (a) incompressible and has zero viscosity (b)compressible and has zero viscosity.(c)incompressible.(d)compressible.
In a pipe of 600 mm diameter and 3000 m length, provided with a valve at its end, water is flowing with a velocity of 2 m/s. Assuming velocity of pressure wave = 1500 m/s, find:
36. The rise in pressure if the valve is closed in 20 seconds:
a.200 KN/ m^2 b. 300 KN/ m^2 c. 150 KN/ m^2 d. 600 KN/ m^2
37. The rise in pressure if the valve is closed in 2.5 seconds. Assume the pipe to be rigid one and take bulk modulus of water as 2 GN/m^2
a. 1140 KN/ m^2 b. 2104 KN/ m^2 c. 141[illegible] KN/ m^2 d. 2 461 KN/ m^2
38. In a laminar flow, Reynold's number is
a. Less than 2000 b. More than 2000 c. More than 2000 but less than 4000 d. None of the above
39. Under which of the following conditions the closure of valve is considered rapid
The duration of valve closure is greater than $\frac{2L}{C}$ b. The duration of valve closure is less than $\frac{2L}{C}$ c. The duration of valve closure is less than $\frac{L}{C}$ d. None of the above
40. Due to which of the following phenomena water hammer is caused
Incompressibility of fluid b. Sudden opening of a valve in a pipeline c. The material of the pipe being elastic d. Sudden closure (partial or complete) of a valve in pipe flow
Three pipes of diameters 300 mm, 200 mm and 400 mm and lengths 300 m, 170 m and 210 m respectively are connected in series. The difference in water surface levels in two tanks is 12 m.
41. Determine the rate of flow if co-efficients of frictions are 0.005, 0.0052 and 0.0048 respectively, considering minor losses
a. 0.9945 m^3/s b. 1.945 m^3/s c. 1.205 m^3/s d. 0.4505m^3/s
42. Determine the rate of flow if co-efficients of frictions are 0.005, 0.0052 and 0.0048 respectively, negleting minor losses
0.1905 m^3/s b. 0.945 m^3/s c. 1.205 m^3/s d. 0.1021m^3/s
43. For a pipe of uniform cross-section the slope of the hydraulic gradient line is/has ..... to the slope of energy gradient line

a. Specific relation b. Equal c. Linear relation d. All of the above

44. In case of a turbulent flow, the loss of head is approximately proportional to

a. Velocity b. velocity^2 c. velocity$^{1/2}$ d. Velocity$^{3/4}$

45. Friction in an open channel is best calculated using an equation called; .....

(a) Darcy – Weisbach formula (b) Chezy's formula (c) Bernoulli's (d) Reynold equation

An existing 300mm diameter pipeline of 3200 length connects two reservoirs with 13m difference in their water levels. Take only wall friction into account. Assume friction factor = 0.04 in Darcy-Weisbach formula.

46. Calculate the discharge Q_1 a.0.698 m^3/s b. 1.094 m^3/sc. c. 0.547 m^3/s d. 1.906m^3/s

47. If a parallel pipe 300mm diameter is attached to last 1600m length of the existing pipeline, find the new discharge Q_2.

0.698 m^3/s b. 1.094 m^3/s c. 0.547 m^3/s d. 1.906m^3/s

48. In case of a parallel pipes: which of this is correct

a.The loss of head in each pipe is same b. The rate of discharge in the main line = sum of the discharges in each of the parallel pipes c. All of the above d. None of the above

49. The Energy Gradient Line (E.G.L) always drops in the direction of flow because of:

a. flow rate b. pressure changes c. loss of head d. all of the above

In a pipe of 300 mm diameter and 800 m length an oil of specific gravity 0.8 is flowing at the rate of 0.45 m^3/s; take kinematic viscosity of oil as 0.3 stroke. Find:

50. The velocity of flow a. 6.366 m/s b. 4.556 m/s c. 8.112 m/s d. 5.636 m/s

51. The Reynolds number a. 6.366×10^4 b. 4.556×10^4 m/s c. 8.112×10^4 m/s d. 5.636×10^4 m/s

52. Co-efficient of Friction a. 0.00173 b. 0.00336 c. 0.00381 d. 0.00498

53. Head lost due to friction a. 111.65m b. 88.97m c. 129.54m d. 109.72 m

54. Power required to maintain the flow a. 287.48 KW b. 387.48 KW c. 484.36 KW d 394.99 KW

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 150 mm diameter and its diameter is suddenly enlarged to 300mm. The height of water level in the tank is 3m above the centre of the pipe. Considering all losses of head which occur, calculate:

55. Calculate the velocity head, V_1 a. 4.44 m/s b. 1.44 m/s c. 1.11 m/s d. 4.90m/s

56.Head loss due to sudden enlargement a. $h_e = 0.19m$, b. $h_e = 0.56m$, c. $h_e = 1.12m$ d. $h_e = 0.51m$,

57. Head loss due to friction in each of the pipes

$hf_1 = 0.126m$, $hf_2 = 6.7m$ b. $hf_1 = 3.308m$, $hf_2 = 1.396m$ c. $hf_1 = 3.973m$, $hf_2 = 1.396m$ d. $hf_1 = 6.7m$, $hf_2 = 0.126m$

58. Calculate the discharge a. 0.0394 m^3/s b. 1.11 m^3/s c. 0.0506 m^3/s d. 0.078m^3/s

59. The energy loss in a pipeline is due to

Surface roughness only b. Viscous action only c. Friction offered by pipe wall as well as by viscous function d. None of the above

60. In a pipe flow the minor losses are those

Which depend on the length of the pipeline b. Caused by friction and are thus also called friction losses c. Which have a small magnitude d. Which are caused on account of total disturbance produced by such fittings as valves, bends, etc