FUNDAMENTAL OF MECHANICAL ENGINEERING AND MECHATRONICS (KME-201T)

Unit III

Introduction to Fluid Mechanics and Applications

OBJECTIVE TYPE QUESTIONS

1. The specific volume of a liquid is the reciprocal of

   a) weight density

   b) mass density

   c) specific weight

   d) specific volume

2. A beaker is filled with a liquid up to the mark of one litre and weighed. The weight of the liquid is found to be 6.5 N. The specific weight of the liquid will be

   a) 6.5 KN/m^3

   b) 6.6 kN/ m^3

   c) 6.7 kN/m^3

   d) 6.8 kN/m^3

3. For an incompressible fluid does density vary with temperature and pressure?

   a) It varies for all temperature and pressure range

   b) It remains constant

   c) It varies only for lower values of temperature and pressure

   d) It varies only for higher values of temperature and pressure

4. The viscous force the relative motion between the adjacent layers of a fluid in motion. Which one of the flowing fits best in the sentence?

   a) opposes

   b) never affects

   c) facilitates

   d) may affect under certain conditions

5. Which one of the following is not a unit of dynamic viscosity?

   a) Pa-s

   b) N-s/m^2

   c) Poise

   d) Stokes

6. The shear stress at a point in a liquid is found to be 0.03 N/m^2. The velocity gradient at the point is 0.15 s^{-1}. What will be it's viscosity (in Poise)?

   a) 20

   b) 2

   c) 0.2

   d) 0.5

7. Two horizontal plates placed 250mm have an oil of viscosity 20 poises. Calculate the shear stress in oil if upper plate is moved with velocity of 1250mm/s.

   a) 20 N/m^2

   b) 2 N/m^2

   c) 10 N/m^2

   d) None of the mentioned

8. What happens to viscosity in the case of incompressible fluids as temperature is increased?

   a) It remains constant

   b) It increases

   c) It decreases

   d) None of the mentioned

9. For a compressible fluid the kinematic viscosity is affected by temperature and pressure variation.

a) True

b) False

10. What is the pressure in Pascals at a depth of 1m below the water surface?

    a) 98100 Pa

    b) 980 Pa

    c) 98 Pa

    d) 1 Pa

11. The device used to measure the fluid pressure is _____

    a) Hygrometer

    b) Calorimeter

    c) Manometer

    d) Thermometer

12. Define Viscosity?

    a) Resistance to flow of an object

    b) Resistance to flow of air

    c) Resistance to flow of fluid

    d) Resistance to flow of heat

13. Which one of the following statements is true regarding pressure?

    a) Pressure is a scalar quantity

    b) Pressure is a vector quantity

    c) Pressure is a scalar quantity only when the area is infinitesimally small

    d) Pressure is a vector quantity only when the area is infinitesimally small

14. The pressure at a point in the fluid is 4.9 N/cm2. Find height when the fluid under consideration is in oil of specific gravity of 0.85.

    a) 5.83 m

b) 11.66 m

c) 17.49 m

d) 8.74 m

15. As we go upwards, at height there is slight decrease in pressure variation.

a) True

b) False

16. What type of flow can be taken for granted in a pipe of a uniform cross-section?

a) steady

b) unsteady

c) uniform

d) non-uniform

17. If a liquid enters a pipe of diameter d with a velocity v, what will it's velocity at the exit if the diameter reduces to 0.5d?

a) v

b) 0.5v

c) 2v

d) 4v >

18. The continuity equation is based on the principle of

a) conservation of mass

b) conservation of momentum

c) conservation of energy

d) conservation of force

19. Two pipes of diameters d1=2d and d2=d converge to form a pipe of diameter 2d. If the liquid flows with a velocity of v1 and v2 in the two pipes, what will be the flow velocity in the third pipe?

a) v1 + v2

b) v1 + v2/2

c) v1 + v2/4

d) 2(v1 + v2)

20. Two pipes, each of diameter d, converge to form a pipe of diameter D. What should be the relation between d and D such that the flow velocity in the third pipe becomes double of that in each of the two pipes?

a) D = d

b) D = 2d

c) D = 3d

d) D = 4d

21. . In unsteady flow, the flow parameters change with respect to position.

a) True

b) False

22. In laminar flow fluid particles flow along a streamline.

a) True

b) False

23. For incompressible fluid flow, if area reduces then what is the effect on the velocity.

a) increases

b) decreases

c) first increases then decreases

d) first decreases then increases

24. What is the formula to find the kinematic viscosity of a fluid?

a) Dynamic Viscosity x Temperature

b) Dynamic Viscosity / Density

c) 1/ dynamic viscosity

d) Density / Dynamic Viscosity

25. When is a fluid said to be ideal?

    a) Non viscous and Incompressible

    b) Viscous and compressible

    c) Viscous and Incompressible

    d) Incompressible

26. Which of the following assumption is incorrect in the derivation of Bernoulli's equation?

    a) The fluid is ideal

    b) The flow is steady

    c) The flow is incompressible

    d) The flow is rotational

27. The principle of Orificemeter is same as that of Venturimeter.

    a) True

    b) False

28. Pump converts mechanical energy into _____

    a) Pressure energy only

    b) Kinetic energy only

    c) Pressure and kinetic energy

    d) Potential energy

29. Hydraulic energy is converted into another form of energy by hydraulic machines. What form of energy is that?

    a) Mechanical Energy

    b) Electrical Energy

c) Nuclear Energy

d) Elastic Energy

30. Which kind of turbines changes the pressure of the water entered through it?

a) Reaction turbines

b) Impulse turbines

c) Reactive turbines

d) Kinetic turbines

31. Which type of turbine is used to change the velocity of the water through its flow?

a) Kinetic turbines

b) Axial flow turbines

c) Impulse turbines

d) Reaction turbines

32. Which type of turbine is a Francis Turbine?

a) Impulse Turbine

b) Screw Turbine

c) Reaction turbine

d) Turgo turbine

33. Which kind of turbine is a Pelton Wheel turbine?

a) Tangential flow turbine

b) Radial flow turbine

c) Outward flow turbine

d) Inward flow turbine

34. In what type of turbine water enters in radial direction and leaves axial direction?

a) Tangential flow turbine

b) Axial flow turbine

c) Outward flow turbine

d) Mixed flow turbine

35. Among the following which turbine requires more head?

a) Pelton Turbine

b) Kaplan Turbine

c) Francis turbine

d) Tube Turbine

36. Head under which Kaplan turbine is operated_____

a) 10-70 meters

b) 70 -100 meters

c) 100-200 meters

d) Above 200 meters

37. Head under which Francis turbine is operated?

a) 10-70 meters

b) 70-100 meters

c) 100-200 meters

d) 40-600 meters

38. Under what head is Pelton turbine operated?

a) 20-50 meters

b) 15-2000 meters

c) 60-200 meters

d) 50-500 meters

39. Pipes of largest diameter which carry water from reservoir to the turbines is known as_____

a) Head stock

b) Tail race

c) Tail stock

d) Pen stock

40. The important type of axial flow reaction turbines are _____

a) Propeller and Pelton turbines

b) Kaplan and Francis turbines

c) Propeller and Francis turbines

d) Propeller and Kaplan turbines

41. Francis and Kaplan turbines are known as _____

a) Impulse turbine

b) Reaction turbine

c) Axial flow turbine

d) Mixed flow turbine

42. Pelton turbine is operated under_____

a) Low head and high discharge

b) High head and low discharge

c) Medium head and high discharge

d) Medium head and medium discharge

43. Kaplan turbine is operated under _____

a) Low head and high discharge

b) High head and low discharge

c) Medium head and high discharge

d) Medium head and medium discharge

44. What is the water flow direction in the runner in a Francis turbine?

a) Axial and then tangential

b) Tangential and then axial

c) Radial and then axial

d) Axial and then radial

45. Which of the following is true in case of flow of water before it enters the runner of a Francis Turbine?

a) Available head is entirely converted to velocity head

b) Available head is entire converted to pressure head

c) Available head is neither converted to pressure head nor velocity head

d) Available head is partly converted to pressure head and partly to velocity head

46. The fluid gains _____ while passing through the impeller.

a) Velocity

b) Pressure

c) Temperature

d) Velocity and pressure

47. Centrifugal pumps are used to transport _____

a) Pressure

b) Speed

c) Power

d) Fluid

48. During the suction stroke the _____ moves left thus creating vacuum in the Cylinder.

a) Piston

b) Cylinder

c) Valve

d) Pump

49. The underlying principle behind a hydraulic press is based on _____ principle.

    a) Bramah's

    b) Pascal's

    c) Stoke's

    d) Newton's

50. A _____ is a storage reservoir under pressure where a liquid is held under pressure.

    a) Hydraulic accumulator

    b) Hydraulic crane

    c) Hydraulic gear

    d) Hydraulic pump

51. In a hydraulic lift _____ is fixed on the crown of the sliding ram where the carried load is located.

    a) Cage

    b) Wire rope

    c) Pulleys

    d) Jiggers

52. The two types of pulleys in a hydraulic lift are _____ and _____

    a) fixed, fixed

    b) movable, fixed

    c) movable, movable

    d) semi-movable, movable

53. Centrifugal pumps transfer energy from _____

    a) Rotor to fluid

    b) Fluid to rotor

c) Draft to rotor

d) Rotor to draft

54. Pascal's law is applied to

    a. Hydraulic jack

    b. Hydraulic accumulator

    c. Hydraulic press

    d. All of these

55. Bernoulli's theorem can be applied to

    a. Fluid in motion

    b. Fluid in rest

    c. Both a and b

    d. None of the above

56. Continuity equation is applicable to

    a. Fluid in motion

    b. Fluid in rest

    c. Both a and b

    d. None of the above

57. The fluid which follows newton's law of viscosity is called

    a. Newtonian

    b. Non-Newtonian

    c. Ideal

    d. None of these

58. Pressure is best defined as

    a. Force per unit area

    b. Rate of change of momentum per unit area

c. Internal force per unit area

d. All of the above

59. A fluid, which is incompressible and is having no viscosity, is known as

    a. Newtonian

    b. Ideal

    c. Non-Newtonian

    d. Ideal plastic

60. ……………..states that the pressure or intensity of pressure at a point in a static fluid is equal in all directions.

    a. Continuity theory

    b. Pascal's law

    c. Bernoulli's principle

    d. None of the above

61. Which of the following is not the application of Bernoulli's equation?

    a. Orifice meter

    b. Pitot tube

    c. Hydraulic ram

    d. Venturi meter

62. ……. are defined as the hydraulic machines which convert hydraulic energy into mechanical energy.

    a. Turbines

    b. Pumps

    c. Pitot tube

    d. Ram

63. Which of the following is not the main part of a Kaplan turbine

a. Scroll casing,

b. Guide vanes mechanism,

c. Penstock

d. Draft tube.

64. Mechanical energy is converted into pressure energy by means of centrifugal force in

    a. Reciprocating pump

    b. Pelton Turbine

    c. Centrifugal pump

    d. Francis turbine

65. Mechanical energy is converted into hydraulic energy by intake the liquid into a cylinder in which a piston is reciprocating in

    a. Reciprocating pump

    b. Pelton Turbine

    c. Centrifugal pump

    d. Francis turbine

66. Which of the the following is not the main part of a centrifugal pump?

    a. Impeller.

    b. Casing.

    c. Draft tube

    d. Delivery pipe.

67. Connecting rod is used in ……. system.

    a. Reciprocating pump

    b. Pelton Turbine

    c. Centrifugal pump

    d. Francis turbine

68. The hydraulic ……..is a device used for storing the energy of a liquid in the form of pressure energy, which may be supplied for any sudden or intermittent requirement.

    a. Accumulator

    b. Reciprocating pump

    c. Lift

    d. Turbine

69. The hydraulic ……….is a device used for carrying passenger or goods from one floor to another multistoried building.

    a. Accumulator

    b. Reciprocating pump

    c. Lift

    d. Turbine

70. Spear is used in

    a. Reciprocating pump

    b. Pelton Turbine

    c. Centrifugal pump

    d. Francis turbine

71. The electric power which is obtained from the hydraulic energy (energy of water) is known as

    a. Hydroelectric power

    b. Thermal power

    c. Electrical power

    d. Wind power

72. A fluid deforms continuously under the influence of a ………. Stress.

    a. Tensile

   b. Compressive

   c. Shear

   d. Bending

73. A substance in the ………phase is called fluid.

   a. liquid or gas

   b. only liquid

   c. only gas

   d. only solid

74. The study of forces acting on the particles or bodies at rest is called

   a. Dynamics

   b. Kinetics

   c. Statics

   d. Mechanics

75. 1 litre is equal to

   a. 0.001 m^3

   b. 0.01 m^3

   c. 0.0001 m^3

   d. 0.1 m^3

76. Pa-s is unit of

   a. Kinematic viscosity

   b. Dynamic viscosity

   c. Specific gravity

   d. Pressure

77. Unit of kinematic viscosity is

   a. Stoke

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    b. Poise

    c. M/s^2

    d. Pa

78. Unit of pressure is

    a. N/m

    b. Pa

    c. m/s

    d. Pa-s

79. Calculation of pressure in static fluid is done by

    a. Hydrostatic law

    b. Pascal's law

    c. Newton's law

    d. None of these

80. If depth is doubled then pressure will be

    a. Double

    b. Half

    c. Same

    d. Data insufficient to answer

81. Absolute pressure is gauge pressure plus

    a. Vacuum pressure

    b. Atmospheric pressure

    c. Total pressure

    d. Vapor pressure

82. …………is that type of flow, in which the velocity, pressure or density at a point changes with respect to time.

    a. Uniform

    b. Non uniform flow

    c. Unsteady flow

    d. Steady flow

83. ….…..is that type of flow in which the fluid particles move in a *zig-zag* way

    a. Non uniform flow

    b. Unsteady flow

    c. Steady flow

    d. Turbulent flow

84. Kinetic head is represented in the

    a. Jule

    b. Watt

    c. Meter

    d. Calorie

85. Determine the viscosity of a liquid having kinematic viscosity 6 stokes and specific gravity 1.9.

    a. 12.4

    b. 11.4

    c. 13.4

    d. 10.4

86. A oil of volume 1 litre having weight 9.6 N. Calculate its specific weight (N/m^3).

    a. 9600

    b. 978

    c. 96000

    d. 0.978

87. What is viscosity (in poise) of a fluid which has the kinematic viscosity 6.00 stokes and specific gravity 2.00?

    a. 12

    b. 1.2

    c. 0.6

    d. 3

88. For Bernoulli's equation to hold good which of the following is incorrect?

    a. Fluid must be ideal

    b. Fluid must be compressible

    c. Fluid must be irrotational

    d. Fluid must be steady

89. A oil of specific gravity 0.8 is flowing through a pipe having diameter of 2 cm at section-1. Given that, Discharge at section 1 is 0.0125 m^3/s. If diameter at section-2 is doubled then what will be discharge at section 2 (m^3/s)?

    a. 0.0125

    b. 0.025

    c. 0.006

    d. 0.125

90. Total head equals to-

    a. Velocity head + Pressure head

    b. Datum head +Kinetic head + Pressure head

    c. Datum head + Pressure head

    d. Datum head +Kinetic energy + Pressure head

91. If the diameter of ram is doubled, force required at plunger will become-

    a. half

   b. quarter

   c. double

   d. four times

92. Unit of following property is m²/s

   a. Kinematic viscosity

   b. Dynamic viscosity

   c. Pressure

   d. Acceleration

93. The shear stress expression of a fluid is given as $\tau = \mu \left(\frac{du}{dy}\right)^{n}$. Value of n is 1 then what type of fluid is this

   a. Ideal

   b. Non-Newtonian

   c. Newtonian

   d. None of the above

94. The shear stress expression of a fluid is given as $\tau = \mu \left(\frac{du}{dy}\right)^{n}$. Value of n is not 1 then what type of fluid is this

   a. Ideal

   b. Non-Newtonian

   c. Newtonian

   d. None of the above

95. The shear stress expression of a fluid is given as $\tau = \mu \left(\frac{du}{dy}\right)^{n}$. Value of μ is zero then what type of fluid is this

   a. Ideal

b. Non-Newtonian

c. Newtonian

d. None of the above

96. The shear stress expression of a fluid is given as $\tau = \mu \left(\frac{du}{dy}\right)^n$. What is μ in this

    a. Kinematic viscosity

    b. Flow velocity

    c. Flow constant

    d. Dynamic viscosity

97. An oil of specific gravity 0.9 has viscosity of 0.28 stokes what will be its viscosity in Ns/m²?

    a. 0.252

    b. 0.0311

    c. 0.0252

    d. 0.0206

98. 1 Poise = ……. Ns/m²·

    a. 10

    b. 0.01

    c. 0.0001

    d. 0.1

99. 1 m/s² = ……… stokes

    a. 10

    b. 100

    c. 1000

    d. 10000

100. A real fluid, in which the shear stress is not proportional to the rate of shear strain (or velocity gradient), known as a ………..fluid.

    a. Newtonian

    b. Non-Newtonian

    c. Ideal

    d. Ideal plastic