

SMART EDITION

1
VOLUME

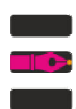
MECHANICAL ENGINEERING

MCQ

Assistant Engineer & Junior Engineer

**Fluid Mechanics • Basic Thermodynamics
IC Engine • Power Plant • RAC • HMT**

Complete in-Depth Solutions of All Question | Topic-wise Bifurcation of Questions
Also Useful for State-AE/JE, PSUs and PSCs Exams

 **EA-Publications[®]**
ENGINEERS ACADEMY PUBLICATIONS

 www.eapublications.org

 + 91-80944 41777

Published by

EAPublications[®]
ENGINEERS ACADEMY PUBLICATIONS

Corporate Office: # 100-102, Ram Nagar, Bambala Puliya, Toll Tax,
Tonk Road, Pratap Nagar, Jaipur (Rajasthan)-302033
E-Mail : engineers.academy.india@gmail.com
Website : www.engineersacademy.org
Helpline Number : +91 8094441777

All Rights Reserved :

This book or part there of cannot be translated or reproduced in any form (except for review or criticism) without the written permission from the Publishers.

ISBN : 978-93-93531-21-6

First Edition : 2013
Second Edition : 2014
Third Edition : 2015
Fourth Edition : 2016
Fifth Edition : 2017
Sixth Edition : 2018
Seventh Edition : 2020
Eighth Edition : 2022
Ninth Edition : 2026

Without prior written permission of publisher and author, no person/publisher/institute should use full part of the text/design/question/material of the book. If any body/publisher/institute is found in default legal action will be taken accordingly.

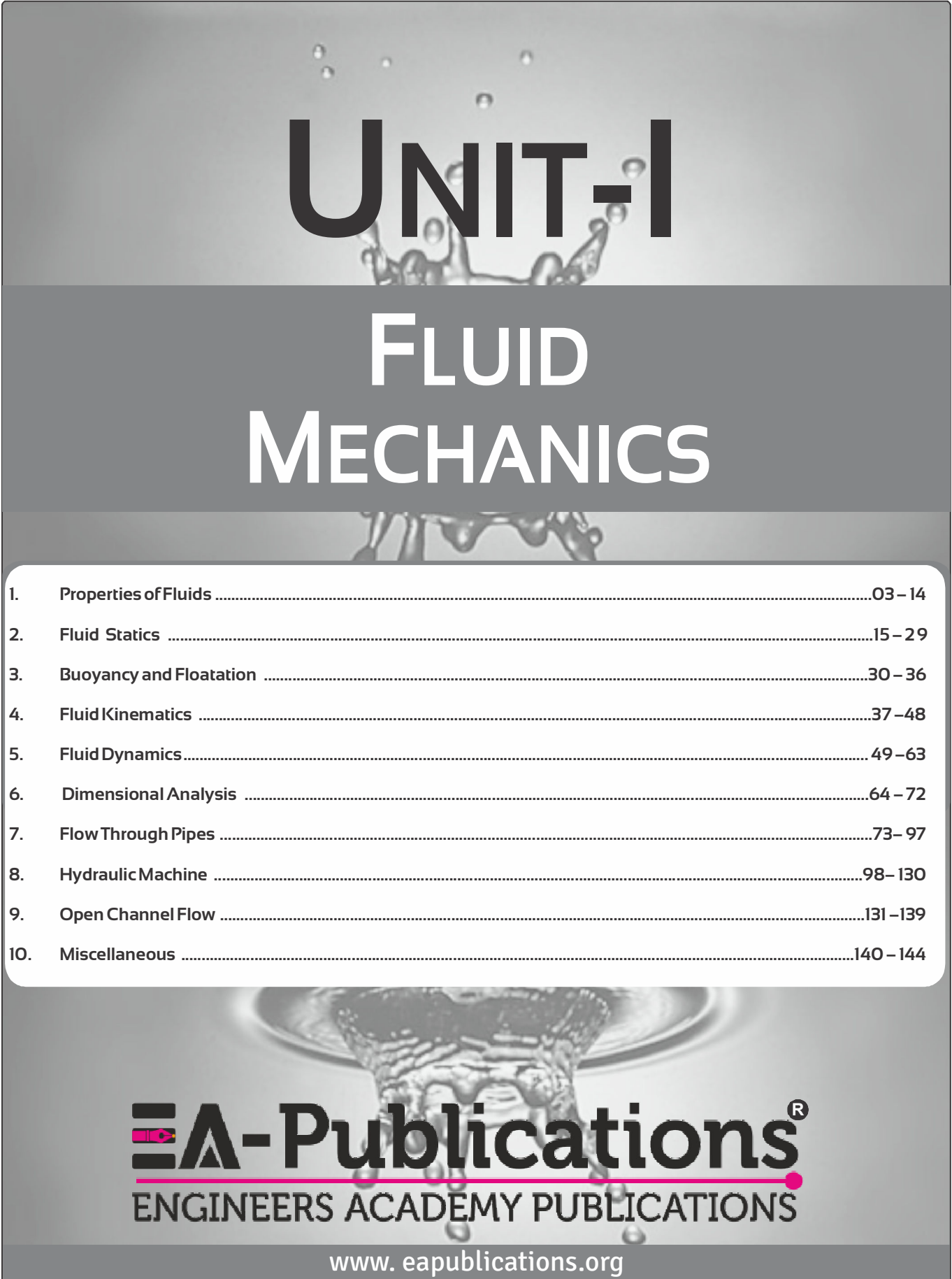
Price : ₹1200.00

Although every effort has been made to avoid mistakes and omissions, there may be possibility some mistakes been left inadvertently. This book is released with the understanding that neither author nor publisher will be responsible in any manner for mistakes/permissions in the book. Dispute, if any, shall be subject to Jaipur (Rajasthan) Jurisdiction only.

Visit www.eapublications.org for buying books online.

CONTENTS

S.No.	TOPIC	Page No.
1.	Fluid Mechanics	03 – 144
2.	Thermodynamics	147 – 226
3.	Internal Combustion Engine	229 – 280
4.	Power Plant	283 – 336
5.	Refrigeration & Air Conditioning.....	339 – 392
6.	Heat and Mass Transfer.....	395 – 472



UNIT-I

FLUID MECHANICS

1.	Properties of Fluids	03 – 14
2.	Fluid Statics	15 – 29
3.	Buoyancy and Floatation	30 – 36
4.	Fluid Kinematics	37 – 48
5.	Fluid Dynamics	49 – 63
6.	Dimensional Analysis	64 – 72
7.	Flow Through Pipes	73 – 97
8.	Hydraulic Machine	98 – 130
9.	Open Channel Flow	131 – 139
10.	Miscellaneous	140 – 144

 **EAPublications[®]**
ENGINEERS ACADEMY PUBLICATIONS

www.eapublications.org

PROPERTIES OF FLUIDS

OBJECTIVE QUESTIONS

CHAPTER

1

1. An ideal fluid
 - (a) Is very viscous
 - (b) Obeys newton's law of viscosity
 - (c) Is assumed in conduit flow
 - (d) Frictionless and incompressible
2. The density of air at 10°C is 1 MPa abs. in SI units is
 - (a) 12.31
 - (b) 1.231
 - (c) 118.4
 - (d) 65.0
3. The viscosity of a fluid varies with
 - (a) Temperature
 - (b) Temperature and pressure
 - (c) Pressure
 - (d) Density
4. A fluid is a substance that
 - (a) Is essentially incompressible
 - (b) Always moves when subjected to a shearing stress
 - (c) Has a viscosity that always increases with temperature
 - (d) Has a viscosity that always decreases with temperature
5. With decrease in temperature, the viscosity in gases generally
 - (a) Increases linearly
 - (b) Increases exponentially
 - (c) Remain unaffected
 - (d) Decreases
6. Viscosity of a fluid with specific gravity 1.3 is measured to be 0.0034 Ns/m². Its kinematic viscosity, in m²/s, is
 - (a) 2.6×10^{-6}
 - (b) 4.4×10^{-6}
 - (c) 5.8×10^{-6}
 - (d) 7.2×10^{-6}
7. Viscosity is the most important property in the
 - (a) Travel of a bullet through air
 - (b) Water jet issuing from a fire air
 - (c) Formation of soap bubbles
 - (d) Flow of castor oil through a tube
8. If the mass density of a liquid is 1000 kg/cum and its dynamic viscosity is 1 Ns/sq.m, then its kinematic viscosity (sq.m/s) will be :
 - (a) 0.1
 - (b) 1
 - (c) 0.001
 - (d) 0.01
9. A fluid in which resistance to deformation is linerly dependent of the shear stress, is known as
 - (a) Bingham plastic fluid
 - (b) Pseudo plastic fluid
 - (c) Dilatant fluid
 - (d) Newtonian fluid
10. Which of the following is not dimensionless quantity?
 - (a) Specific gravity
 - (b) Pressure coefficient
 - (c) Darcy weisbach friction factor
 - (d) Kinematic viscosity
11. One poise is equivalent to
 - (a) 360 kg/m-hr
 - (b) 1 dyne sec/cm²
 - (c) 10⁻¹ kg./m-sec
 - (d) All the above
12. In a flowing fluid, a particles may posses
 - (a) Inertial energy
 - (b) Pressure energy
 - (c) Kinetic energy
 - (d) All of the above
13. When the rheogram for a fluid at any temperature and pressure is a straight line passing through origin, the fluid is said to be
 - (a) Ideal plastic
 - (b) Bingham
 - (c) Newtonian
 - (d) Non-newtonian
14. A pressure of 500 kPa applied to 2m³ of liquid results in a volume change of 0.004 m³. The bulk modulus, in MPa, is
 - (a) 2.5
 - (b) 25
 - (c) 250
 - (d) 2500
15. SI unit of kinematic viscosity is : –
 - (a) N.s/m²
 - (b) m²/s
 - (c) N/m
 - (d) N.s/m

[RPSC-VPITI, Haryana JE, ISRO - 2018]

16. A fluid, which satisfies the relations ' $\tau = \mu (du/dy)$ ', where ' τ ' is shear stress, μ constant of proportionality and (du/dy) is the rate of deformation, is known as : –
 (a) Newtonian fluid
 (b) Non – Newtonian fluid
 (c) Thixotropic fluid/ substance
 (d) Plastic
[RPSC-VPITI]
17. Which of the following fluids can be classified as non-newtonian ?
 (a) Kerosene oil and Diesel oil
 (b) Human blood and Toothpaste
 (c) Diesel oil and water
 (d) Kerosene oil and water
[LMRC-JE]
18. Which of the following fluid is incompressible and is having no viscosity?
 (a) Real fluid (b) Non-Newtonian fluid
 (c) Ideal fluid (d) Newtonian fluid
[PEB-SUB ER. - 2017, Haryana JE - 2018]
19. Poise is a unit for which of the following?
 (a) Specific volume
 (b) Viscosity
 (c) Kinematic viscosity
 (d) Mass density
[PEB-SUB ER. - 2017]
20. Specific gravity is also called as ____.
 (a) Relative density (b) Mass density
 (c) Specific weight (d) Weight density
[PEB-SUB ER. - 2017]
21. In CGS system, the unit of kinematic viscosity is stoke, where 1 stoke = ____.
 (a) $10^6 \text{cm}^3/\text{s}$ (b) 10^{-2}m^2
 (c) $10^4 \text{cm}^3/\text{s}$ (d) $10^{-4} \text{m}^2/\text{s}$
[PEB-SUB ER. - 2017]
22. The ratio of the mass of a fluid to its volume is known as ____.
 (a) Mass density (b) Viscosity
 (c) Specific weight (d) Weight density
[PEB-SUB ER. - 2017]
23. Dynamic viscosity (μ) has the dimension as :
 (a) MLT^{-2} (b) $\text{ML}^{-1}\text{T}^{-1}$
 (c) $\text{ML}^{-1}\text{T}^{-2}$ (d) $\text{M}^{-1}\text{L}^{-1}\text{T}^{-1}$
[MPSC - 2012, AEC - 2017]
24. A fluid in equilibrium cannot sustain:
 (a) tensile stress (b) compressive stress
 (c) shear stress (d) bending stress
[ISRO - 2015, NHPC - 2013]
25. One kilo Pascal is equivalent to :
 (a) 10 N/mm^2 (b) 1000 N/m^2
 (c) 100 N/mm^2 (d) 1000 N/cm^2
[NBCC - 2017]
26. Fluids undergo volume change under external pressure due to
 (a) Plasticity (b) Viscosity
 (c) Tenacity (d) Compressibility
[ISRO - 2018]
27. 1 centipoise = _____ poise.
 (a) $1/10$ (b) $1/100$
 (c) $1/50$ (d) $1/25$
[Haryana JE - 2018]
28. The viscosity of water at 20°C is
 (a) 0.05 poise (b) 0.1 poise
 (c) 0.01 poise (d) 0.1 centipoise
[Haryana JE - 2018]
29. A vessel of 4 m^3 contains oil which weight 30 kN. The specific weight of the oil is
 (a) 4.5 kN/m^3 (b) 6 kN/m^3
 (c) 7.5 kN/m^3 (d) 10 kN/m^3
[ISRO - 2017]
30. The variation in the volume of a liquid with the variation of pressure is called its
 (a) Surface tension (b) Compressibility
 (c) Capillarity (d) Viscosity
[ISRO - 2017]
31. Newton's law of viscosity is a relationship between
 (a) Pressure, velocity and temperature
 (b) Shear stress and rate of shear strain
 (c) Shear stress and velocity
 (d) Rate of shear strain and temperature
[ISRO - 2017]
32. Pascal-sec is the unit of
 (a) Pressure (b) Kinematic viscosity
 (c) Dynamic viscosity (d) Surface tension
[PMB JE - 2018]
33. If the volume of a liquid weighing 3000 kg is 4 cubic meters, 0.75 is its
 (a) Specific weight (b) Specific mass
 (c) Specific gravity (d) Specific volume
[ISRO - 2013]
34. The property of a fluid which offers resistance to the movement of one layer to another adjacent layer is called ____.
 (a) Viscosity (b) Slip
 (c) Opacity (d) Velocity
[DMRC - 2018]

35. When a matter resists applied shear stress by static deformation, it is :
 (a) Liquid (b) Gas
 (c) Fluid (d) Solid
[DDA JE - 2018]
36. Surface tension has the dimensions
 (a) FL^{-1} (b) F
 (c) FL^{-2} (d) FL^{-3}
[UK Combined AE - 2012, SSC JE - 2011]
37. If salt is added in water, the surface tension of water will :
 (a) Increase (b) Decrease
 (c) Will not change (d) None of the above
[UPSSSC JE - 2015]
38. The weight per unit volume of a liquid at standard temperature and pressure is called :
 (a) Specific weight (b) Specific mass
 (c) Mass density (d) Specific gravity
[F.C.I. JE - 2015]
39. Surface tension of water
 (a) Increases with decreases in temperature
 (b) Decreases with decreases in temperature
 (c) Independent of temperature
 (d) None of these
[MP SUB Eng. - 2016]
40. The stress, which is responsible for retaining water in a capillary tube above the free water surface of the water body in which the capillary tube is inserted, is called the
 (a) Capillary compression
 (b) Capillary tension
 (c) Capillary pore pressure
 (d) None of these
[MP SUB Eng. - 2016]
41. Rheology is the study of
 (a) Newtonian fluids (b) Ideal fluids
 (c) Non-Newtonian fluids (d) None of these
[H.P. SSC - 2015]
42. If the mass density of a fluid is 789 kg/m^3 Taking $g = 9.806 \text{ m/sec}^2$. Specific volume will be
 (a) $0.126 \text{ m}^3/\text{kN}$ (b) $0.122 \text{ m}^3/\text{kN}$
 (c) $0.129 \text{ m}^3/\text{kN}$ (d) $0.132 \text{ m}^3/\text{kN}$
[UK Combined AE - 2012]
43. With an increase in the radius of the tube, the rise of liquid in the tube due to surface tension will _____
 (a) Decrease
 (b) Increase
 (c) Remains unchanged
 (d) Cannot be said
[UK Combined AE - 2012]
44. What shall be the pressure intensity inside a soap bubble of radius 4 cm? (Surface tension of water is 0.0736 N/m) :
 (a) 7.36 N/m^2 (b) 1.84 N/m^2
 (c) 3.68 N/m^2 (d) None of these
[UPSSSC JE - 2016]
45. Which of the following is not the unit of pressure?
 (a) Kg/cm^2 (b) Psi
 (c) Atmosphere (d) Newton
[UP Jal Nigam JE - 2016]
46. The expression for kinematic viscosity of a fluid is-
 (a) Dynamic viscosity $\times$ density
 (b) Dynamic viscosity / density
 (c) Dynamic viscosity $\times$ pressure
 (d) None of the above
[Uttarakhand AE - 2013]
47. Which of the following is dimensionless?
 (a) Specific volume (b) Specific weight
 (c) Specific gravity (d) Specific speed
[DMRC JE - 2017]
48. The region within which the effect of viscosity is confined, is known as
 (a) Cavitation (b) Stagnation layer
 (c) Boundary layer (d) Free layer
[UPRVUNL JE - 2015]
49. A fluid whose viscosity changes with the rate of deformation is known as :
 (a) Newtonian fluid (b) Laminar flow
 (c) Turbulent flow (d) Non-newtonian fluid
[MP SUB. Eng. - 2016]
50. Match List I with List II and choose the correct answer from the options given below :
List-I
(Physical quantity)
 A. Angular velocity B. Angular acceleration
 C. Discharge D. Kinematic viscosity
List-II
(Dimension)
 a. L^2T^{-1} b. T^{-1}
 c. T^{-2} d. L^3T^{-1}
 (a) A-a, B-b, C-d, D-a
 (b) A-b, B-c, C-d, D-a
 (c) A-c, B-d, C-a, D-b
 (d) A-b, B-d, C-a, D-c
[LMRC JE - 2015]

63. Capillarity of liquid in small-diameter tubes is due to molecular attraction. In case of Mercury, the following occurs in terms of capillarity

(a) Capillary rise (b) Capillary depression
(c) Capillary flattening (d) Compressibility

[RRB SSE - 2015]

64. The density of water is :

(a) 10^{-3} kg/m^3 (b) 1 kg/m^3
(c) 10^2 kg/m^3 (d) 10^3 kg/m^3

[RRB JE - 2014]

65. Water has its maximum density at :

(a) 0°C (b) 100°C
(c) 50°C (d) 4°C

[RRB JE - 2014]

66. If cohesion between molecules of fluid is greater than adhesion between fluid and glass, then the free level of fluid in a dipped glass tube will be

(a) Higher than the surface of liquid
(b) The same as the surface of liquid
(c) Lower than the surface of liquid
(d) Unpredictable

67. Dynamic viscosity of the liquids with rise in temperature

(a) Does not show any change
(b) Increases
(c) Decreases (d) None of these

68. Property of a fluid because of which its own molecules attract each other is

(a) Adhesion (b) Compressibility
(c) Cohesion (d) Capillarity

69. Viscosity of water in comparison to mercury is

(a) Variable and unstable
(b) Higher
(c) Lower (d) Same

70. Angle of contact in case of a liquid depends upon

(a) The material existing above the free surface of the liquid
(b) The nature of the liquid and solid
(c) Both of the above
(d) Depends upon temperature

71. The rise or fall of head 'h' in a capillary tube of diameter 'd' and liquid surface tension ' σ ' and specific weight 'w' is equal to

(a) $\frac{2d}{w\sigma}$ (b) $\frac{4\sigma}{wd}$
(c) $\frac{3w\sigma}{d}$ (d) $\frac{4wd}{\sigma}$

72. The bulk modulus of elasticity of a

(a) Fluid decreases with the increase in pressure
(b) Liquid decreases with increase of temperature
(c) Liquid increases with increase in temperature
(d) None of the above

73. For a soap bubble, the surface tension σ and difference of pressure (ΔP) are related as

(a) $\Delta P = \frac{4\sigma}{d}$ (b) $\Delta P = \frac{\sigma}{4d}$
(c) $\Delta P = \frac{\sigma}{2d}$ (d) $\Delta P = \frac{8\sigma}{d}$

where d is diameter of bubble

74. Mercury doesn't wet glass. This is due to property known as

(a) Surface tension (b) Adhesion
(c) Viscosity (d) Cohesion

75. The viscosity of water with respect to air is about

(a) 50 times (b) 55 times
(c) 60 times (d) 65 times

76. Match List I with List II and select the correct answer :

List I		List II	
A	Ideal fluid	1	Shear stress does not vary linearly with the rate of strain
B	Newtonian fluid	2	Tensile stress varies linearly with the rate of strain
C	Non-Newtonian fluid	3	Shear stress is zero
D	Bingham plastic	4	Viscosity decreases with increase in temperature
		5	Shear stress varies linearly with the rate of strain
		6	Fluid behaves like a solid until a minimum yield stress beyond which it exhibits a linear relationship between shear stress and the rate of strain

(a) A-3, B-5, C-6, D-1 (b) A-3, B-5, C-1, D-6
(c) A-5, B-3, C-4, D-2 (d) A-5, B-4, C-3, D-2

[CGPSC]

77. Determine the bulk modulus of elasticity of liquid, if the pressure of liquid is increased from 60 N/cm^2 to 120 N/cm^2 . The volume of liquid was found to decrease by 0.20%.

(a) $1 \times 10^4 \text{ N/cm}^2$ (b) $2 \times 10^4 \text{ N/cm}^2$
(c) $3 \times 10^4 \text{ N/cm}^2$ (d) $4 \times 10^4 \text{ N/cm}^2$

[CGPSC]

78. A clean glass tube of 2 mm diameter contains water at 40°C. The capillary rise is approximately
 (a) 5 mm (b) 10 mm
 (c) 15 mm (d) 20 mm
 [CGPSC]
79. Which of the following statements is INCORRECT about thixotropic fluids?
 (a) Apparent viscosity depends on the time of shearing
 (b) Thixotropy is an irreversible process
 (c) Thixotropic fluid shows shear thinning behavior
 (d) Thixotropic fluids are in general non-Newtonian fluids
 [CEPTM - 2009]
80. The mass density of one litre of diesel of relative density 0.6 is :
 (a) 1000 kg/m³ (b) 6000 kg/m³
 (c) 60 kg/m³ (d) 600 kg/m³
 [WRD B. Tech - 2013]
81. The excess pressure in a droplet of 0.002 m diameter a fluid with surface tension of 0.01 N/m is
 (a) 10 (b) 20
 (c) 4π (d) 0.00004π
 [AEM - 2017]
82. Surface tension is a phenomenon due to
 (a) Cohesion only
 (b) Viscous force only
 (c) Adhesion between liquid and solid molecules
 (d) Difference in magnitude between the forces due to adhesion and cohesion
83. Newton's law of viscosity is given by the relation
 (a) $\tau = \mu^2 \frac{du}{dy}$ (b) $\tau = \mu \frac{du}{dy}$
 (c) $\tau = \mu \frac{dy}{du}$ (d) $\tau = \mu^2 \frac{dy}{du}$
 [CEMPM - 2018]
84. Compressibility is the reciprocal of
 (a) Bulk modulus of elasticity
 (b) Shear modulus of elasticity
 (c) Young's modulus of elasticity
 (d) Viscosity
 [CEMPM - 2018]
85. Which one of the following is defined as force per unit length –
 (a) Surface tension (b) Compressibility
 (c) Capillarity (d) Viscosity
 [RRB JE - 2015]
86. For a fluid at rest–
 (a) The shear stress is zero only on the horizontal plane
 (b) The shear stress is zero
 (c) The shear stress is maximum on a plane inclined at 45° to the horizontal
 (d) The shear stress depends upon the co-efficient of viscosity
 [UPSSC JE - 2015]
87. Match List-I (fluid properties) with List-II (related terms) and select the correct answer using the given lists:

List-I	List-II
A. Capillarity	a. Cavitation
B. Vapour pressure	b. Density of water
C. Viscosity	c. Shear forces
D. Specific gravity	d. Surface tension

 (a) A-a, B-d, C-b, D-c (b) A-a, B-d, C-c, D-b
 (c) A-d, B-a, C-b, D-c (d) A-d, B-a, C-c, D-b
 [UPRVUNL JE - 2015]
88. A liquid compressed in a cylinder has initially a volume of 20 m³ at a pressure of 100 pa. If the new volume is 40 m³ at a pressure of 50 Pa, the bulk modulus of elasticity would be :
 (a) 20 Pa (b) –20 Pa
 (c) 50 Pa (d) –50 Pa
 [UPRVUNL AE - 2014]
89. A glass tube of 3 mm diameter is immersed in water which is at 20°C. The surface tension for water is 0.0736 N/m. The contact angle for water is 0°. How much will be the capillary rise or depression?
 (a) 20 mm (b) 10 mm
 (c) 0.492 cm (d) 0.56 cm
 [MP SE - 2016]
90. The coefficient of viscosity may be observed by
 (a) Capillary tube method
 (b) Orifice type viscometer
 (c) Rotating cylinder method
 (d) All of these
 [MP SE - 2016]
91. Free surface of a liquid tends to contract to the smallest possible area due to force of
 (a) Adhesion (b) Viscosity
 (c) Gravity (d) Surface tension
 [MP SE - 2016]
92. Compressibility is equal to
 (a) $\frac{-(dV/V)}{dp}$ (b) $\frac{dp}{-(dV/V)}$
 (c) $\frac{dp}{dp}$ (d) $\sqrt{\frac{dp}{dp}}$
 [Uttarakhand JE - 2008]

93. Specific volume is ratio of
(a) Mass and volume (b) Volume and mass
(c) Weight and volume (d) Volume and weight
[RWRD JE - 2014]
94. Which one of the following is correct unit of surface tension
(a) N/m^2 (b) J/m
(c) J/m^2 (d) W/m
[UPRVNL JE - 2016]
95. What is the ratio of specific weight of a liquid of the specific weight of pure water at a standard temperature called as?
(a) Density of liquid
(b) Specific gravity of liquid
(c) Compressibility of liquid
(d) Surface tension of liquid
[Vizag Steel M.T. - 2011]
96. The mass per unit volume of a liquid at a standard temperature and pressure is called
(a) Specific weight (b) Mass density
(c) Specific gravity (d) None of these
[Vizag Steel (J.T.) - 2017, HP - 2018]
97. The height to which a liquid will rise in an open capillary tube is inversely proportional to :
(a) Temperature of liquid (b) Density of liquid
(c) Air pressure (d) Surface tension
[ISRO Vikram Sarabhai - 2017]
98. Which property of mercury is the main reason for use in barometers?
(a) Low density
(b) Negligible capillary effect
(c) Very low vapour pressure
(d) Low compressibility
[UPPSC AE - 2016]
99. The increase in pressure of a liquid
(a) Lowers the boiling point of a liquid
(b) Raises the boiling point of a liquid
(c) Does not effect the boiling point of a liquid
(d) Reduces its volume
[MP SE - 2016]
100. One liter of water occupies a volume of :
(a) 100 m^3 (b) 1000 cm^3
(c) 10000 cm^3 (d) 100000 m^3
[MP SE - 2016]
101. The desirable properties for an practical fluids :
(a) Should be viscous
(b) Should posses surface tension
(c) Should be compressible
(d) All of the above
[MP SE - 2016]
102. The surface tension at the soap-air interface is 0.1 N/m . The internal pressure in the soap bubble of 32 mm diameter is _____ N/m^2 .
(a) 12.5 (b) 25
(c) 37.5 (d) 50
[MT-24.01.2021]
103. For an incompressible fluid, the density
(a) varies with temperature only
(b) varies with pressure only
(c) varies with both pressure and temperature
(d) remain constant
[JPSC]
104. Which fluid does not experience stress during flow?
(a) Dilatant (b) Bingham
(c) Viscoplastic (d) Inviscid
[JPSC]
105. Which of the following is a non-Newtonian fluid?
(a) Air (b) Water
(c) Gasoline (d) None of the above
[ISRO - 2020]
106. If temperature increases, viscosity of the gases _____ and the viscosity of liquids _____.
(a) decreases, increases (b) increases, decreases
(c) increases, increases (d) decreases, decreases
[Vizag Steel - 2020]
107. What happens to the liquid level. When a small diameter tube is inserted into a liquid whose contact angle is 125° ?
(a) Liquid level in the tube falls
(b) Liquid level in the tube remains constant
(c) Liquid level in the tube will fall first and then rise.
(d) Liquid level in the tube rises.
[CIL (MT) - 26.03.2017]
108. The viscosity of liquids decreases with increase in temperature due to :
(a) decreased cohesive forces
(b) decreased molecular momentum transfer
(c) increased molecular momentum transfer
(d) increased cohesive forces
[CIL (MT) - 26.03.2017]
109. The specific gravity of water is
(a) 0.001 (b) 0.01
(c) 0.1 (d) 1
[HP - 2018]
110. One cubic meter of water weighs
(a) 100 litre (b) 250 litre
(c) 500 litre (d) 1000 litre
[HP - 2018]

111. A liquid compressed in cylinder has a volume of 0.04 m^3 at 50 kg/cm^2 and a volume of 0.039 m^3 at 150 kg/cm^2 . The bulk modulus of liquid is
 (a) 400 kg/cm^2 (b) 4000 kg/cm^2
 (c) $40 \times 10^5 \text{ kg/cm}^2$ (d) $40 \times 10^6 \text{ kg/cm}^2$
 [ISRO - 2007]
112. The diameter of a soap bubble which has an inside pressure of 2.5 N/m^2 over the atmospheric pressure and a surface tension of 0.0125 N/m is
 (a) 40 mm (b) 4 mm
 (c) 16 mm (d) 60 mm
 [ISRO - 2012]
113. An increase in pressure of a liquid from 7.5 MPa to 15 MPa results into 0.2 percent decrease in its volume. The coefficient of compressibility of the liquid in m^2/N is
 (a) 0.267×10^{-9} (b) 2.67×10^{-9}
 (c) 1×10^{-9} (d) None of the above
 [ISRO - 2012]
114. A reservoir of capacity 0.01 m^3 is completely filled with a fluid of coefficient of compressibility $0.75 \times 10^{-9} \text{ m}^2/\text{N}$. The amount of fluid that will spill over (in m^3), if pressure in the reservoir is reduced by $2 \times 10^7 \text{ N/m}^2$ is
 (a) 1×10^{-4} (b) 1.5×10^{-4}
 (c) 0.15×10^{-4} (d) None of the above
 [ISRO - 2012]
115. Poise can also be expressed as
 (a) Dyne-cm/s^2 (b) Dyne-cm/s
 (c) Dyne-s/cm (d) Dyne-s/cm^2
 [RRB-JE - 2015 (III)]
116. Which one of the following is defined as force per unit length
 (a) Surface tension (b) Compressibility
 (c) Capillarity (d) Viscosity
 [RRB-JE - 2015 (I)]
117. Kinematic viscosity of gases on increase of temperature
 (a) Decreases
 (b) Increases
 (c) Remains the same
 (d) First decreases then increases
 [RRB-JE - 2015 (I)]
118. The intensity of pressure developed by surface of 0.075 N/m in a droplet of water of 0.075 mm diameter is
 (a) 0.8 N/cm^2 (b) 0.6 N/cm^2
 (c) 0.4 N/cm^2 (d) 400 N/cm^2
 [RRB-JE - 2015 (III)]
119. In the equation for capillary rise or fall of a liquid $h = \frac{4\sigma \cos \theta}{\rho r}$, the value of θ for water is
 (a) 0° (b) 10°
 (c) 45° (d) 180°
 [TSPSC - 2015]
120. The dynamic viscosity of fluid is 0.7 poise and specific gravity is 0.8 , then the kinematics viscosity of fluid in stokes is
 (a) 0.22 (b) 1.14
 (c) 0.87 (d) 0.34
 [UPRVUNL - 2016]
121. Viscosity of gases
 (a) Remains constant with temperature
 (b) Increases with increase in temperature
 (c) Decreases with increase in temperature
 (d) Increases with decrease in temperature
 [JKSSB-JE]
122. The unit of dynamic viscosity is
 (a) N/m/sec (b) Nm/sec
 (c) Nm/sec (d) $\frac{\text{N sec}}{\text{m}^2}$
 [TNPSC 1998]
123. The kinematic viscosity of oil of specific gravity 0.8 and dynamic viscosity 2 poise is
 (a) 2.5 centistoke (b) $2500 \text{ cm}^2/\text{sec}$
 (c) $2.5 \times 10^{-4} \text{ cm}^2/\text{sec}$ (d) 2.5 stokes
 [TNPSC - 1998, APPSC-2013]
124. The stress-strain relation of the newtonian fluids is
 (a) Linear (b) Parabolic
 (c) Hyperbolic (d) Involutic
 [TNPSC-1998, APPSC-2013, APPSC-(Observe 2013)]
125. The newton's law of viscosity relates
 (a) The stress and strain in the fluid
 (b) The shear stress, pressure and velocity
 (c) The shear stress and rate of shear strain
 (d) The viscosity and the shear stress
 [TNPSC-APPSC-2013]
126. If the surface tension of a soap air interface is 0.09 N/m , the difference between the internal and external pressure in the soap bubble of 3 cm diameter is-
 (a) 22 (b) 20
 (c) 24 (d) 30
 [CGSES-2015]
127. Capillary rise a phenomenon that is attributed to the following property of fluid.
 (a) Vapour pressure (b) Viscosity
 (c) Density (d) Surface tension
 [SSC-JE-2014]
128. The bulk modulus of elasticity of a compressible fluid for isothermal process is equal to
 (a) p (b) kp
 (c) k (d) none of these
 [APPSC-1984]

ANSWERS SHEET1. *Ans. (d)*2. *Ans. (a)*

$$P = \rho RT$$

$$\rho = \frac{P}{RT}$$

$$= \frac{1 \times 10^6}{0.287 \times 1000 \times 283}$$

$$= 12.31 \text{ kg/m}^3$$

3. *Ans. (a)*4. *Ans. (b)*5. *Ans. (d)*6. *Ans. (a)*

$$\gamma = \frac{\mu}{\rho}$$

$$= \frac{0.0034}{1300}$$

$$= 2.6 \times 10^{-6} \text{ m}^2/\text{sec}$$

7. *Ans. (d)*8. *Ans. (c)*

$$\nu = \frac{\mu}{\rho} = \frac{1}{1000} = 0.001 \text{ m}^2/\text{sec}$$

9. *Ans. (d)*10. *Ans. (d)*11. *Ans. (d)*12. *Ans. (d)*13. *Ans. (c)*14. *Ans. (c)*

$$K = \left(\frac{dP}{-\frac{dv}{V}} \right)$$

$$= \frac{500 \times 10^3}{-\left(-\frac{0.004}{2} \right)}$$

$$= 250 \times 10^6$$

$$= 250 \text{ MPa}$$

15. *Ans. (b)*

$$\nu = \frac{\mu}{\rho} = \frac{\frac{\text{kg}}{\text{m} \cdot \text{sec}}}{\frac{\text{kg}}{\text{m}^3}} = \frac{\text{m}^2}{\text{sec}}$$

16. *Ans. (a)*17. *Ans. (b)*18. *Ans. (c)*19. *Ans. (b)*20. *Ans. (a)*21. *Ans. (d)*22. *Ans. (a)*23. *Ans. (b)*24. *Ans. (c)*25. *Ans. (b)*26. *Ans. (d)*27. *Ans. (b)*

$$1 \text{ centpoise} = 10^{-2} \text{ poise}$$

28. *Ans. (c)*29. *Ans. (c)*

$$\text{specific weight} = \frac{\text{weight}}{\text{volume}}$$

$$\gamma = \frac{30}{4} \frac{\text{kN}}{\text{m}^3} ; \gamma = 7.5 \text{ kN/m}^3$$

30. *Ans. (b)*31. *Ans. (b)*32. *Ans. (c)*33. *Ans. (c)*

$$\rho = \frac{3000}{4} = 750 \text{ kg/m}^3$$

$$\text{Specific gravity} = \frac{750}{1000} = 0.75$$

34. *Ans. (a)*

Viscosity is the resistance to flow offered by one layer of fluid on another.

35. *Ans. (d)*36. *Ans. (a)*37. *Ans. (a)*38. *Ans. (a)*39. *Ans. (a)*40. *Ans. (b)*41. *Ans. (c)*42. *Ans. (c)*

$$\nu = \frac{1}{\rho} = \frac{1}{789} \text{ m}^3/\text{kg}$$

$$= \frac{1}{789 \times 9.81} \text{ m}^3/\text{kN}$$

$$= 0.129 \text{ m}^3/\text{kN}$$

FLUID STATICS

OBJECTIVE QUESTIONS

CHAPTER

2

1. The line of action of force exerted by a liquid on a plane area passes through the
 - (a) Centre of pressure (b) Centre of buoyancy
 - (c) Centre of gravity (d) Centre of inertia
2. The depth of centre of pressure in rectangular lamina of height h with one side in the liquid surface is at
 - (a) h (b) $\frac{h}{3}$
 - (c) $\frac{2h}{3}$ (d) $\frac{h}{2}$
3. A closed cubical box 0.8 m on each side, is half filled with water and the other half being filled with oil of specific gravity 0.75. Then the pressure difference at the bottom and top layers in pascal.
 - (a) 7678 (b) 5800
 - (c) 8628 (d) 6867
4. 1 N/m^2 pressure is equivalent to
 - (a) 1 pascal (b) 10^{-5} bar
 - (c) Both (a) and (b) (d) None of these
5. The total force on the surface of a vertical sluice gate $2 \text{ m} \times 1 \text{ m}$ with its top 2 m, surface being 0.5 m below the water level will be
 - (a) 5 kN (b) 10 kN
 - (c) 15 kN (d) 20 kN
6. The point in the immerse body through which the resultant pressure of the liquid may be taken to act is known as
 - (a) Metacentre (b) Centre of pressure
 - (c) Centre of buoyancy (d) Centre of gravity
7. A piezometer cannot be used for pressure measurement in pipes when
 - (a) Pressure difference is low
 - (b) Velocity is high
 - (c) Fluid in the pipe is a gas
 - (d) Fluid is highly viscous
8. The location of resultant force acting on a body submerged in water (i.e. depth of centre of pressure) will be
 - (a) $h_G + \frac{I_G}{h_G A}$ (b) $h_G + \frac{h_G A}{I_G}$
 - (c) $h_G - \frac{I_G}{h_G A}$ (d) $h_G + \frac{h_G}{I_G A}$

where h_G = depth of centroid of the surface,
 A = area
 I_G = M.I. of the surface about an axis lying in the surface, passing through its centroid and parallel to the free surface.
9. If a surface is inclined at angle θ with the liquid surface, then total pressure on the immersed surface will be
 - (a) $wA\bar{x}$ (b) $wA\bar{x}\cos\theta$
 - (c) $wA\bar{x}\sin\theta$ (d) $wA\bar{x}\tan\theta$
10. A barometer is used to measure
 - (a) Very low pressures
 - (b) Very high pressures
 - (c) Pressure of fluid in a pipe line
 - (d) Atmospheric pressure
11. Vertical component of pressure force on a sub-merged curved surface is equal to
 - (a) Its horizontal component
 - (b) The force on a vertical projection of the curved surface
 - (c) The product of pressure at centroid and surface area
 - (d) The weight of liquid vertically above the curved area
12. 1 atm. pressure is equivalent to
 - (a) $1.01325 \times 10^5 \text{ N/m}^2$
 - (b) 760 mm Hg
 - (c) 1.01325 bar
 - (d) All the above

13. If a barometer carries water instead of mercury, the height of column for a pressure equivalent to 75 cm of mercury will be
 (a) 1020 cm (b) 1000 cm
 (c) 1034 cm (d) 1040 cm
14. A vertical wall is subjected to liquid (of specific weight 'w') pressure on one side. If h be the height of liquid surface, then total pressure on wall per unit length is
 (a) wh (b) $\frac{wh}{2}$
 (c) $\frac{wh^2}{2}$ (d) $\frac{2}{3}wh$
15. The horizontal component of force on a curved surface is equal to the
 (a) Weight of liquid vertically above the curved surface
 (b) Weight of liquid retained by the curved surface
 (c) Product of pressure at its centroid and area
 (d) Force on a projection of the curved surface into a vertical plane
16. What shall be pressure head of a liquid of specific gravity 0.8 for a pressure head of 100 m of water: –
 (a) 80 m (b) 125 m
 (c) 160 m (d) 64 m
 [RPSC-VPITI]
17. Which one of the following pressure units represents the least pressure?
 (a) Millibar (b) mm of Mercury
 (c) N/mm² (d) kgf/cm²
18. Atmospheric pressure is measured by ____.
 (a) Altimeter (b) Piezometer
 (c) Barometer (d) Spectrometer
 [PEB-SUB ER. - 2017]
19. Differential manometers are used to measure
 (a) Pressure in water channels
 (b) Pressure in water pipes
 (c) Difference of pressure between any two points
 (d) Atmospheric pressure
20. The position of centre of pressure on a plane surface immersed vertically in a static mass of fluid is
 (a) At the centre of submerged area
 (b) Always above the centre of gravity
 (c) Always below the centre of gravity
 (d) Has no relation with centre of gravity
 [TSPSC-AE - 2015]
21. The pressure in meters of oil (specific gravity 0.8) equivalent to 80 m of water is
 (a) 64 (b) 80
 (c) 100 (d) 88
 [LBS-ASST.PROF. - 2017]
22. The atmospheric pressure head is ____ mm of mercury.
 (a) 9.81 (b) 760
 (c) 10.33 (d) 9810
 [Haryana JE - 2018]
23. The rise of liquid in manometers gives the
 (a) Mercury level at that point.
 (b) Discharge capacity at that point.
 (c) Pressure head at that point.
 (d) Density of water at that point.
 [Haryana JE - 2018]
24. The distance of centre of pressure from the surface of liquid is _____ of the density of the liquid.
 (a) Dependent
 (b) Independent
 (c) Inversely proportional
 (d) Directly proportional
 [Haryana JE - 2018]
25. A vertical triangular area with vertex downward and altitude 'h' has its base lying on the free surface of a liquid. The centre of pressure below the free surface is at a distance
 (a) h/4 (b) h/3
 (c) h/2 (d) 2h/3
 [TSPSC-AE - 2015, Chandigarh JE - 2016]
26. 1 bar = _____ N/m²
 (a) 10² (b) 10³
 (c) 10⁴ (d) 10⁵
 [Haryana JE - 2018]
27. The pressure or intensity of pressure at a point in a static fluid is equal in all directions states by
 (a) Pascal's Law (b) Newton's Law
 (c) Euler's Law (d) Reynold's Law
 [Haryana JE - 2018]
28. The pressure which is measured with reference to absolute zero pressure is
 (a) Gauge pressure (b) Absolute pressure
 (c) Atmospheric pressure (d) None of the above
 [Haryana JE - 2018]
29. The pressure of a liquid measured with the help of piezometer tube is
 (a) Vacuum pressure (b) Atmospheric pressure
 (c) Absolute pressure (d) Gauge pressure
 [ISRO - 2017]

45. When metacenter and center of gravity of any floating body coincide, the floating body will be:
 (a) Floating equilibrium
 (b) Unstable equilibrium
 (c) Neutral equilibrium
 (d) Stable equilibrium
[UPSSSC JE - 2015]
46. Pascal's law states that pressure at a point is equal in all directions, in a
 (a) Static solid (b) Static fluid
 (c) Static gas (d) Moving fluid
[Uttarakhand JE - 2015]
47. The ratio of pressure between the points A and B located at depths 0.5m and 2.0m respectively below a constant level of water in tank is
 (a) $1:\sqrt{2}$ (b) 1 : 2
 (c) 1 : 4 (d) 1 : 16
[Uttarakhand JE - 2015]
48. The total pressure on a plane surface submerged in a liquid and inclined at an angle θ with the horizontal will be
 (a) $\rho \cdot A \cdot g \bar{x}$ (b) $\rho \cdot A \sin \theta$
 (c) $\rho \cdot A \cdot \cos \theta$ (d) $\rho \cdot A \cdot \tan \theta$
[Uttarakhand JE - 2015]
49. The centre of pressure of a submerged plainular region is?
 (a) Free from orientation of region
 (b) In the centroid of Region
 (c) Always below the centroid
 (d) Point where the resultant force act on the region due to pressure
[LMRC JE - 2016]
50. In order to avoid sliding of masonry dam, the force of friction between the dam and soil should be at least _____ the total water pressure per meter length.
 (a) Equal to (b) 1.5 times
 (c) Double (d) 2.5 times
[UPSSSC JE - 2015]
51. Which one of the following pressure unit represents the least pressure?
 (a) millibar (b) mm of mercury
 (c) N/mm^2 (d) kgf/cm^2
[UK Combined AE - 2012, RJC Exam - 2016]
52. The pressure less than the atmospheric pressure is known as
 (a) Suction pressure (b) Vacuum pressure
 (c) Negative pressure (d) All the above
[UK Combined AE - 2012]
53. Piezometer is suitable for fluid related measurements which are _____.
 (a) Small and positive (b) Small and negative
 (c) Large and positive (d) Large and negative
[UPPCL JE - 2016]
54. A piezometer tube in pipes measures :
 (a) Velocity head (b) Total pressure
 (c) Static pressure (d) Negative static pressure
[NMRC JE - 2017]
55. Atmospheric pressure at a location is recorded as 74.8 cm of mercury (sp. gr. = 13.6) column. This pressure is equal to :
 (a) 99795 N/m^2
 (b) 1 MPa
 (c) 10.34 m of Water Column
 (d) 1 Kg/cm^2
[MP SUB Eng. - 2015]
56. For measuring the static pressure in a pipe, a pressure gauge is usually connected to :
 (a) Orifice meter (b) Venturimeter
 (c) Barometer (d) Piezometric
[UP RVNL AE - 2016]
57. Gauge pressure has _____ value.
 (a) Zero
 (b) Positive
 (c) Negative
 (d) Zero positive or negative
[UPPCL JE - 2016]
58. Manometer is used for measuring
 (a) Velocity at a point in a fluid
 (b) Pressure at a point in a fluid
 (c) Difference of pressure between two points
 (d) Both (b) and (c)
[UP Jal Nigam JE - 2013, Uttarakhand JE - 2015]
59. The pressure measured with the help of a piezometer tube is in :
 (a) N/mm^2 (b) N/m^2
 (c) Head of liquid (d) N/cm^2
[DMRC JE - 2015]
60. Absolute pressure in flow system-
 (a) Is always above the atmospheric pressure
 (b) Is equal to a vacuum pressure
 (c) May be above, below or equal to the local atmospheric pressure
 (d) Is also called negative pressure
[RRB JE - 2015]

75. The phenomenon of cavitation occurs if the pressure of the flowing liquid at any point is :
 (a) More than vapour pressure of liquid
 (b) Less than the vapour pressure of liquid
 (c) Equal to vapour pressure of liquid
 (d) Falls below the atmospheric pressure
[RWRD JE - 2014]
76. Hydraulic press works on the principle of
 (a) Pascal's law (b) Bernoulli's law
 (c) Newton law (d) Archimedi's law
[M.P. Vyapam - 2017, RSMSSB-2020(M)]
77. Which of the following statement is incorrect?
 (a) Stress is more commonly used for solids
 (b) Stress can act both parallel and perpendicular to the object
 (c) Pressure is more commonly used for fluids
 (d) Pressure can act both parallel and perpendicular to the object
[M.P. Vyapam - 2017]
78. Pascal's law states that the pressure at a point is equal in all directions for :
 (a) Confined compressible fluid
 (b) Confined incompressible fluid
 (c) Fluid having Laminar/Viscous flow
 (d) All fluids
[ISRO - 2017]
79. The pressure of liquid on a surface will always act to the surface
 (a) Parallel (b) Normal
 (c) 45° (d) 60°
[ISRO - 2017]
80. What is the pressure equivalent to a water column of height 1 meter?
 (a) 9800 N/m^2 (b) 800 N/m^2
 (c) 1000 N/m^2 (d) 1800 N/m^2
[Irrigation Kerla PSC - 2014]
81. What is the intensity of pressure at a depth of 6 m below the free surface of water?
 (a) 58860 N/m^2 (b) 6000 N/m^2
 (c) 58.86 N/m^2 (d) 6 N/m^2
[Irrigation Kerla PSC - 2017]
82. Convert the pressure head of 3 m of oil having specific gravity 0.8 into equivalent water head
 (a) 2.4 m of water (b) 3.75 m of water
 (c) 0.24 m of water (d) 0.375 m of water
[Irrigation Kerla PSC - 2017]
83. If barometer reads 70 mm of Hg then what is the value of pressure in SI units (kN/m^2)
 (a) 9.3 (b) 101.3
 (c) 100 (d) 760
[M.P. Vyapam - 2017]
84. What the liquid used in manometers should have?
 (a) Low density
 (b) High vapour pressure
 (c) Low surface tension
 (d) High surface tension
[Vizag Steel M.T. - 2011]
85. If a water tank contain 1.3 m deep water. The pressure exerted by the water per metre length of the tank would be?
 (a) 2.89 kN (b) 8.29 kN
 (c) 9.28 kN (d) 28.9 kN
[Vizag steel M.T. - 2011]
86. A differential mercury manometer connected to pipes carrying water gives a reading of 30 cm. What is intensity of pressure inside the pipe?
 (a) 37.77 KPa (b) 36.09 KPa
 (c) 40 KPa (d) 37.08 KPa
[DMRC - 2017]
87. If the depth of the body immersed in some liquid from the free surface increase, then the total pressure force exerted by the liquid will :
 (a) Decrease (b) Remain the same
 (c) Be unpredictable (d) Increase
[DMRC - 2017]
88. The fluid which is "no motion and forces" is known as :
 (a) Kinetic (b) Static
 (c) Dynamic (d) Kinematic
[DMRC - 2017]
89. Let the atmospheric pressure at sea level is 70 cm of mercury. Convert this pressure in terms of height of water (in meter).
 (a) 9 (b) 9.5
 (c) 8.5 (d) 8
[UPRVNL JE - 2016]
90. Sensitivity of U-tube manometer with inclined leg depends are
 (a) Specific weight of fluid
 (b) Length of inclined leg
 (c) Angle of inclination of leg
 (d) Atmospheric pressure
[UPRVNL JE - 2016]

91. One torr pressure is equivalent to
 (a) 1 Pascal (b) 10 metres of water
 (c) 1 atmosphere (d) 1 mm of mercury

[Bihar JE - 2016, SSC JE - 2012]

92. Inclined single column Manometer is useful for the measurement of pressure :
 (a) Negative (b) Small
 (c) Medium (d) High

[RSMSSB AE - 2017]

93. What will be the depth of a point below water surface in sea, where pressure intensity is 1.006 MN/m^2 ? (specific gravity of sea water = 1.025)
 (a) 10 m (b) 100 m
 (c) 1000 m (d) 1 m

[Uttarakhand JE - 2008]

94. According to hydrostatic law, the 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) Mass of the fluid

[UPRVUNL JE - 2014]

95. The pressure at a depth of 5 m below the surface of the sea water, considering sp. Gravity of water to be 1.3, will be
 (a) 63765 Pa (b) 637650 Pa
 (c) $1.27 \times 10^8 \text{ Pa}$ (d) $1.27 \times 10^9 \text{ Pa}$

[Uttarakhand JE - 2013]

96. Broadly speaking water is
 (a) 10 times more compressible than steel
 (b) 80 times more compressible than steel
 (c) 80 times less compressible than steel
 (d) 120 times less compressible than steel

[IOF JE - 2014]

97. Atmospheric pressure is 1.03 kg/cm^2 and vapour pressure is 0.03 kg/cm^2 , So the air pressure will be
 (a) 1.03 Kg/cm^2 (b) 1.06 Kg/cm^2
 (c) 1 Kg/cm^2 (d) 0.53 Kg/cm^2

[MP Sub Engineer - 2016]

98. In case of a rotameter, which one of the following statement is correct?
 (a) Float has a density lower than the density of the flowing fluid
 (b) Float has a density equal to the density of the flowing fluid
 (c) Float has a density greater than the density of the flowing fluid
 (d) None of the above

[MP Sub Engineer - 2016]

99. Determine the values of absolute pressure if the gauge pressure is 21 bar and atmospheric pressure is 1.013 bar.
 (a) 21 bar (b) 22.013 bar
 (c) 20 bar (d) None of the above

[MP Sub Engineer - 2016]

100. The reading of the pressure gauge fitted on a vessel is 25 bar. The atmospheric pressure is 1.03 bar and the value of g is 9.81 m/s^2 . The absolute pressure in the vessel is
 (a) 23.97 bar (b) 25.00 bar
 (c) 26.03 bar (d) 34.84 bar

[UPRVUNL JE - 2015]

101. As per Pascal's law:
 (a) intensity of pressure at a point in a moving fluid is equal in the direction of applied force.
 (b) intensity of pressure at a point in a static fluid is equal in the direction of applied force.
 (c) intensity of pressure at a point in a static fluid is equal in all directions.
 (d) intensity of pressure at a point in a moving fluid is equal in all directions.

[NLC India - 2020]

102. A rectangular plate 3 m long and 1 m wide is immersed vertically in water in such a way that its 3 m side is parallel to the water surface and the plate is 1 m below it. The total pressure on the plate is _____.
 (a) 22.07 kN (b) 44.14 kN
 (c) 66.21 kN (d) 88.28 kN

[Vizag Steel - 2020]

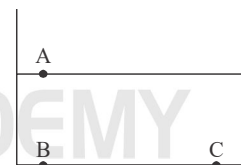
103. Atmospheric pressure head is equal to:
 (a) Zero m of water (b) 10.3 m of water
 (c) 8 m of water (d) 2.5 m of water

[Coal India - 27.02.2020]

104. A barometer reads 765 mm of Hg. The atmospheric pressure is
 (a) 0.51 bar (b) 7.65 bar
 (c) 3.82 bar (d) 1.02 bar

[Coal India - 27.02.2020]

105. A beaker half filled with water is exposed to the atmosphere. If the pressure at points A, B and C as shown in figure are P_A , P_B and P_C respectively, which one of the following will be the relation connecting the three?



- (a) $P_A > P_B > P_C$ (b) $P_A < P_B < P_C$
 (c) $P_A < P_B = P_C$ (d) $P_A > P_B = P_C$

[RSMSSB-13.12.2020(E)]

106. Which statement is true regarding fluid pressure above atmospheric pressure?
 (a) Absolute pressure = Gauge pressure – Atmospheric pressure
 (b) Absolute pressure = Atmospheric pressure – Gauge pressure
 (c) Absolute pressure = Atmospheric pressure + Gauge pressure
 (d) Absolute pressure = (Atmospheric pressure – Gauge pressure)/2

[RSMSSB-13.12.2020(E)]

107. A hydraulic press has a ram of 30 cm diameter and plunger of 3 cm diameter. Find the weight lifted by the hydraulic press when the force applied at the plunger is 500N.

(a) 50 kN (b) 20 kN
(c) 40 kN (d) 30 kN

[Vizag Steel - 2021]

108. Which of the following statements is False, in case of centre of pressure of a submerged vertical circular plate from free surface of the liquid?

(a) Position of the centre of pressure is calculated by using the principle of moments
(b) Position of the centre of pressure lies below the centre of gravity of vertical surface
(c) Position of the centre of pressure is directly proportional to height from free surface of the liquid
(d) Position of the centre of pressure is directly proportional to the density of the liquid

[Vizag Steel - 2021]

109. A vacuum gauge fixed on a steam condenser reads 80 kPa. The barometer indicates 1.013 bar. The absolute pressure in terms of mercury head

(a) 160 mm of Hg (b) 190 mm of Hg
(c) 380 mm of Hg (d) 760 mm of Hg

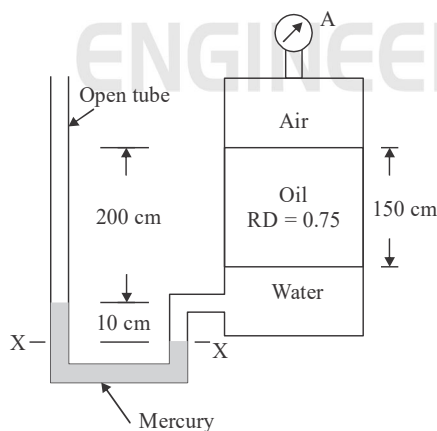
[UPSSC-AE-13.12.2020]

110. A hydraulic press is a device used

(a) to store pressure energy which may be supplied to a machine later on.
(b) to increase the intensity of pressure of water by means of energy available from a large quantity of water at low pressure.
(c) to lift larger load by the application of a comparatively much smaller forces.
(d) All of the above.

[HP - 2018]

111. The tank shown in the figure below is closed at top and contains air at a pressure of P_A . The value of P_A for the manometer readings shown will be



(a) -3.573 kPa (b) -4.573 kPa
(c) -6.573 kPa (d) -7.573 kPa

[ISRO - 2007]

112. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50 cm of mercury. Determine the differential pressure head in orifice. Take the specific gravity of oil as 0.9.

(a) 7.05 m of oil (b) 5.05 m of oil
(c) 4.75 m of oil (d) 3.35 m of oil

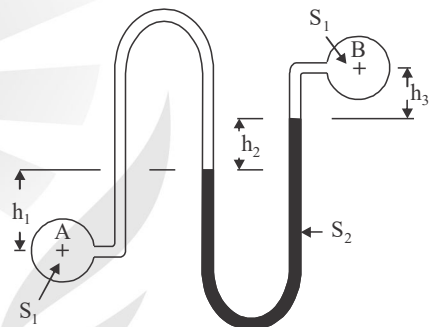
[ISRO - 2008]

113. A manometer measures the pressure differential between two locations of a pipe carrying water. If the manometric liquid is mercury (specific gravity 13.6) and the manometer showed a level difference of 20 cm, then the pressure head difference of water between the two tapings will be

(a) 1.26 m (b) 2.72 m
(c) 1.36 m (d) 2.52 m

[ISRO - 2011]

114. Two pipe lines at a different pressures, p_A and p_B , each carrying the same liquid of specific gravity of S_1 are connected to a U tube with a liquid of specific gravity of S_2 resulting in the level differences h_1 , h_2 and h_3 as shown in the figure. The difference in pressure head between points A and B in terms of head of water is



(a) $h_1 S_2 + h_2 S_1 + h_3 S_1$ (b) $h_1 S_1 + h_2 S_2 - h_3 S_1$
(c) $h_1 S_1 + h_2 S_2 + h_3 S_1$ (d) $h_1 S_1 + h_2 S_2 + h_3 S_1$

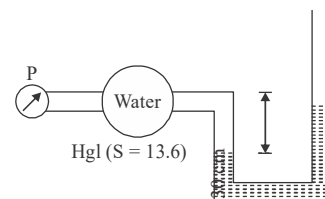
[ISRO - 2006]

115. An open tank contains water to a depth of 2 m and oil over it to a depth of 1 m. If the specific gravity of oil is 0.8, then the pressure intensity at the interface of the two fluid layers will be

(a) 9750 N/m² (b) 8720 N/m²
(c) 9347 N/m² (d) 7848 N/m²

[ISRO - 2011]

116. In the given figure pressure p , in kPa, is



(a) 37.0 (b) 48.0
(c) 45.2 (d) 51.3

[ISRO - 2010]

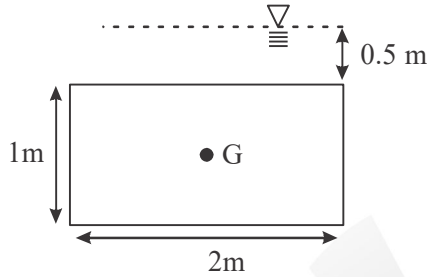
ANSWERS SHEET

1. *Ans. (a)*
 2. *Ans. (c)*
 3. *Ans. (d)*

$$P = 750 \times 9.8 \times 0.4 + 1000 \times 9.8 \times 0.4$$

$$= 6867 \text{ N/m}^2$$

4. *Ans. (c)*
 5. *Ans. (d)*



$$F = \rho A g h \quad (\because g = 10 \text{ m/s}^2)$$

$$= 1000 \times 2 \times 1 \times 10 \times 1$$

$$= 20 \text{ kN}$$

6. *Ans. (b)*
 7. *Ans. (c)*
 8. *Ans. (a)*
 9. *Ans. (a)*
 10. *Ans. (d)*
 11. *Ans. (d)*
 12. *Ans. (d)*
 13. *Ans. (a)*

$$\rho_w g h = \rho_{Hg} g h_{Hg}$$

$$\Rightarrow 1000 h_w = 13.6 \times 1000 \times 75$$

$$h_w = 1020 \text{ cm}$$

14. *Ans. (c)*

$$F = \rho A g h$$

$$= \rho \times (h \times 1) \times g \times \frac{h}{2}$$

$$= \frac{\rho g h^2}{2}$$

15. *Ans. (d)*
 16. *Ans. (b)*

$$P = \rho g h$$

$$\Rightarrow \rho_1 g h_1 = \rho_2 g h_2$$

$$0.8 \times h_1 = 100$$

$$h_1 = \frac{100}{0.8} = 125 \text{ m}$$

17. *Ans. (a)*
 18. *Ans. (c)*
 19. *Ans. (c)*

20. *Ans. (c)*
 21. *Ans. (c)*

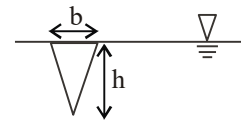
$$P = \rho g h$$

$$\rho_1 g h_1 = \rho_2 g h_2$$

$$0.8 \times h_1 = 80$$

$$h_1 = \frac{80}{0.8} = 100 \text{ m}$$

22. *Ans. (b)*
 23. *Ans. (c)*
 24. *Ans. (b)*
 25. *Ans. (c)*



$$h^* = \bar{h} + \frac{I_G}{A \bar{h}}$$

$$h^* = \frac{h}{3} + \frac{\frac{bh^3}{36}}{\frac{1}{2}bh \times \frac{h}{3}}$$

$$h^* = \frac{h}{3} + \frac{h}{6}$$

$$h^* = \frac{h}{2}$$

26. *Ans. (d)*
 27. *Ans. (a)*
 28. *Ans. (b)*
 29. *Ans. (d)*
 30. *Ans. (d)*
 31. *Ans. (b)*
 32. *Ans. (a)*

$$x^* = \bar{x} + \frac{I_G}{A \bar{x}} \sin^2 \theta$$

For,

$$\theta = 90^\circ$$

$$x^* - \bar{x} = \frac{I_G}{A \bar{x}}$$

33. *Ans. (c)*
 34. *Ans. (d)*

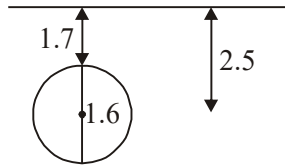
$$1 \text{ atm} = 101,325 \text{ Pa or N/m}^2$$

$$\gamma_w = 9.81 \times 10^3 \text{ N/m}^2$$

$$P = \gamma_w \times h$$

$$\Rightarrow \frac{101325}{9.81 \times 10^3} = 10.33 \text{ m}$$

126. Ans. (a)



$$h^* = \bar{h} + \frac{I_x \cdot \sin^2 \theta}{\bar{h} \times A}$$

$$h^* = 2.5 + \frac{I_x \cdot \sin^2 \theta}{\bar{h} \times A}$$

$$h^* = 2.5 + \frac{\frac{\pi}{64} \times D^4 \times \sin^2 90}{2.5 \times \frac{\pi}{4} \times d^2}$$

$$h^* = 2.5 + 0.064$$

$$h^* = 2.564 \text{ m}$$

127. Ans. (a)

128. Ans. (b)

$$P = \rho gh$$

$$\rho \propto h$$

Pressure at a point in static fluid is proportional to the depth

129. Ans. (b)

Center of pressure

$$\bar{h}_{cp} = \bar{h} + \frac{I_G \sin^2 \theta}{A \bar{h}}$$

→ Depth of C.G. from surface

$$\text{So } \bar{h}_{cp} > \bar{h}$$

130. Ans. (d)

$$\text{Pressure (P)} = \rho gh$$

Where

ρ = density of water

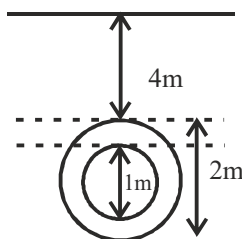
g = gravity force

h = height/depth

$$\text{then } \frac{P_1}{P_2} = \frac{\rho g_1 h_1}{\rho g_2 h_2}$$

$$= \frac{0.5}{8} = \frac{1}{16}$$

131. Ans. (c)



$$F_R = \rho g \bar{h} A$$

$$= 10^3 \times 10 \times (4) \times \frac{\pi}{8} (2^2 - 1^2)$$

$$= 12,000 \pi$$

Where concentric circles given means 2D shape is given then

$$\bar{h} = h = 4 \text{ m (only surface)}$$

132. Ans. (d)

$$\bar{h}_{cp} = \bar{h} + \frac{I_G \times \sin^2 \theta}{\bar{h} \times A}$$

$$= \left[R - \frac{4R}{3\pi} \right] + \frac{0.1097R^4}{\left(R - \frac{4R}{3\pi} \right) \times \frac{\pi R^2}{2}}$$

$$= (R - 0.4244 R) + 0.16455 R$$

$$= 0.7401 R$$

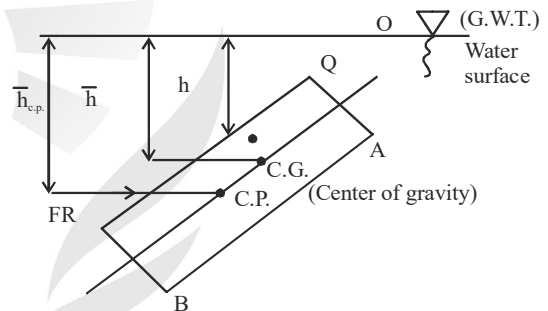
133. Ans. (b)

Where

F_R = Reaction force at centre of pressure

$\bar{h}$ = height of centre of gravity

$\bar{h}_{c.p.}$ = height of centre of pressure from water surface



134. Ans. (b)

$$\text{Total pressure} = \frac{1}{2} w H^2 \times b$$

$$= \frac{1}{2} \times 196.2 \times 5 \times 3$$

$$= 1.4715 \text{ MN}$$

135. Ans. (d)

$$h = 2.5 \text{ m}$$

$$a = 4.9 \text{ m/s}^2$$

Pressure exerted on the base

$$= \rho gh \left(1 + \frac{a}{g} \right)$$

$$= 1000 \times 9.86 \times 2.5 \times \left(1 + \frac{4.9}{9.8} \right)$$

$$= 29.4 \text{ kPa}$$

□□□