

**Tutorials for**

**Fluid Mechanics**  
**(Basic Science Courses)**  
**(BE04006051)**

**B.E. Semester 4 (Civil)**



**Directorate of Technical Education**  
**Gandhinagar, Gujarat**

# CIVIL ENGINEERING DEPARTMENT

GOVERNMENT ENGINEERING COLLEGE DAHOD

Even Semester. Term Dates: 01/01/2026 to 06/05/2026

<i>Tutorial- I (Module 1 as Per GTU Syllabus)</i>		
<i>Properties of Fluids</i>		
	<b>Answer the following</b>	<b>Mapped With</b>
1	Differentiate between Mass density and specific weight.	CO1
2	Define specific gravity, specific volume and vapour pressure.	CO1
3	Differentiate between elasticity and compressibility.	CO1
4	Define and explain surface tension and capillarity.	CO1
5	State and prove Newton's Law of Viscosity.	CO1
6	Write a note on different types of fluids.	CO1
7	What is viscosity and its types.	CO1

<i>Tutorial- II (Module 2 as Per GTU Syllabus)</i>		
<i>Fluid Statics, Pressure measurement and Floating bodies</i>		
	<b>Answer the following</b>	<b>Mapped With</b>
1	Enlist different fluid pressure measuring apparatus/ instrument.	CO1
2	State and prove Pascal's Law	CO1
3	State and derive Hydrostatic Law.	CO1
4	Differentiate among different types of pressure.	CO1
5	Differentiate between U-tube manometer, Inverted U-tube manometer.	CO1
6	Write a note on total pressure and centre of pressure.	CO1
7	State Archimedes principle.	CO1
8	State the stability conditions for submerged fluid flow.	CO1
9	What is Meta centric height? Derive analytical equation of metacentric height.	CO1

***Tutorial- III (Module 3 and Module 4 as Per GTU Syllabus)***

***Fluid Kinematics and Fluid Dynamics***

	<b>Answer the following</b>	<b>Mapped With</b>
1	Define Streamlines, Path lines, Streak lines and Stream tubes.	CO2
2	Enlist different types of fluid flow.	CO2
3	Differentiate steady-unsteady and uniform-non uniform flow.	CO2
4	Differentiate between rotational and irrotational flow	CO2
5	Compare Laminar and Turbulent flow for pipes	CO2, CO3
6	Write a note on Subcritical, critical and Supercritical flow	CO2
7	Explain Velocity Potential function and streamline function.	CO2
8	Derive the Euler's Equation of Motion.	CO2
9	State Bernoulli's Theorem. Explain its significance with applications.	CO2
10	What is Reynolds transport theorem.	CO2

***Tutorial- IV (Module 5 as Per GTU Syllabus)***

***Flow Measuring Devices***

	<b>Answer the following</b>	<b>Mapped With</b>
1	Define Venturimeter, orificemeter, rotameter and nozzlemeter.	CO2, CO3
2	What is Pitot tube?	CO2, CO3
3	What is Orifice? What are the different hydraulic coefficients associated with orifice.	CO2, CO3
4	Differentiate between orifice and mouthpiece.	CO2, CO3
5	Enlist different types of Mouthpiece.	CO2, CO3
6	Differentiate between Notches and Weirs.	CO2, CO3
7	Define velocity of Approach.	CO2, CO3

***Tutorial- V (Module 6 as Per GTU Syllabus)***

***Flow Past Immersed Bodies***

	<b>Answer the following</b>	<b>Mapped With</b>
1	Write the types of drag and lift.	CO4
2	Derive the equations and phenomenon of drag on sphere, cylinder, flat plate and Airfoil.	CO4
3	What is Magnus effect.	CO4
4	Explain the concept and effect of Lift.	CO4
5	What are the Circulation and lift characteristics of airfoils.	CO4
8	Differentiate among smooth and rough boundaries.	CO4
9	Explain the water hammer phenomenon in pipe flow.	CO4

***Tutorial- VI (Module 7 as Per GTU Syllabus)***

***Dimensional Analysis***

	<b>Answer the following</b>	<b>Mapped With</b>
1	What is Dimensional Homogeneity.	CO5
2	State and Explain the theorems associated with dimensional analysis.	CO5
3	Enlist the criteria of determining dimensionless parameters.	CO5
4	What is Model similitude?	CO5
5	Differentiate among geometric, kinematic and dynamic similarity.	CO5

**Pick up the Most appropriate answer:**

1	What is fluid Mechanics? Study of fluid behavior _____			
	A	At rest	B	At Motion
	C	At rest and Motion	D	All of Above
2	Which of the following is the basic principle in fluid mechanics			
	A	Momentum Principle	B	Energy Equation
	C	Continuity equation	D	All of the above
3	If a person studies about a fluid which is at rest, what will you call his domain of study?			
	A	Fluid Dynamics	B	Fluid Mechanics
	C	Fluid Statics	D	Fluid Kinematics
4	Which of the following method is used exclusively in fluid mechanics?			
	A	Eulerian method	B	Lagrangian method
	C	Neither Lagrangian nor Eulerian method	D	Both Lagrangian and Eulerian methods
5	When is a fluid called turbulent?			
	A	High viscosity of fluid	B	Reynolds number is greater than 2000
	C	Reynolds number is greater than 2000	D	The density of the fluid is low
6	Stagnation point is the point in fluid mechanics where the velocity of the fluid at that point is ____			
	A	Unity	B	constant
	C	Infinite	D	zero
7	Which among the following provides the third principle in fluid mechanics?			
	A	Conservation of Heat	B	Conservation of volume
	C	Conservation of linear momentum	D	Conservation of mass

8	Principle of fluid mechanics works on the utilization of ____			
	A	Velocity	B	Accelerating mass
	C	Volume	D	Work
9	Open channel flow takes place ____			
	A	In a pump	B	Within a cylindrical depth
	C	On a free surface	D	In the pipe
10	Which of the following is a type of fluid based on viscosity?			
	A	Real Fluid	B	Ideal Fluid
	C	Newtonian Fluid	D	All of the mentioned
11	Pressure intensity or force due to pressure gradient for fluid at rest is considered as which of the following kind of force?			
	A	Body force	B	Force due to motion
	C	Surface force	D	None of the mentioned
12	Which of the following equation must be perfunctorily satisfied while dealing with fluid flow problems?			
	A	Newton's third law	B	Law of conservation of momentum
	C	Continuity equation	D	Newton's second law
13	Which among the following is an assumption of Hagen-Poiseuille equation?			
	A	Fluid is uniform	B	Fluid is laminar
	C	Fluid is turbulent	D	Fluid is compressible
14	Which of the following is a formula for the friction factor of circular pipes?			
	A	$Re/64$	B	$16/Re$
	C	$64/Re$	D	$Re/16$
15	Which among the following is not global parameters of fluid?			
	A	Mass flow rate	B	Density
	C	Viscosity	D	External diameter
16	Which among the following have the same forces acting on them?			
	A	Dynamic similarity	B	Geometric similarity
	C	Conditional similarity	D	Kinematic similarity

17	In a stationary fluid, how does the local pressure of the liquid vary?		
	A	In the horizontal direction, only	B With depth only
	C	Neither with depth nor along the horizontal direction	D Both with depth and along the horizontal direction
18	Which of the following cannot be the value of a fluid's absolute pressure at any point?		
	A	1.013 bar	B 0
	C	200 bar	D - 1 bar
19	In a U-tube manometer, one end is open to the atmosphere, the other end attached to a pressurized gas of gauge pressure 40 kPa. The height of the fluid column on the atmospheric side is 60 cm, and that on the gas side is 30 cm. The manometric fluid used is: (Take $g = 9.8 \text{ m/s}^2$ ).		
	A	Liquid ammonia	B Water
	C	Mercury	D Oil
20	What happens to the buoyant force acting on the airship as it rises in the air?		
	A	Buoyant force decreases	B Buoyant force increases
	C	Buoyant force first increases then show a decrease	D Buoyant force remains constant
21	What type of flow can be taken for granted in a pipe of a uniform cross-section?		
	A	Unsteady	B Steady
	C	Non-Uniform	D Uniform
22	"The velocity of entrance and exit through a nozzle remains the same." Is this even possible?		
	A	only if the flow is laminar	B only if the flow is compressible
	C	never possible	D only if the flow is rotational
23	Permissible settlement is maximum in the case of What will be the shape of the pathline for a one-dimensional flow be like?		
	A	Parabolic	B Straight line
	C	Elliptical	D Hyperbolic
24	For incompressible fluid flow, if area reduces, then what is the effect on the velocity.		

	A	Decreases	B	Increases
	C	first decreases, then increase	D	first increases, then decrease
25	When a fluid element moves from one position to another, what type of motion is it?			
	A	Linear Deformation	B	Linear Translation
	C	Rotation	D	Angular Deformation
26	The flow of fluid along a curvilinear or curved path is known as			
	A	Vortex Flow		Sink Flow
	C	Circular Flow		Curvilinear Flow
27	What type of liquids are measured using a manometer?			
	A	Medium Liquids	B	Heavy Liquids
	C	Heavy and light liquid	D	Light Liquid
28	Which device is popularly used for measuring the difference of low pressure?			
	A	U-tube Differential Manometer	B	Downward movement of pile Inverted U-tube Differential Manometer
	C	Vertical Single column manometer	D	Inclined Single column manometer
29	The minimum centre to centre distance of a friction pile should be Which term is associated with dimensional analysis,			
	A	Similitude,	B	Laminar
	C	Turbulent	D	One Dimensional
30	Forces are considered and cause of forces are also considered in analysis in which			
	A	Fluid Statics	B	Fluid Kinematics
	C	Fluid Dynamics	D	All of above

## References:

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GEC-D-FM-25-26

## **Civil Engineering**

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