Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(New) • EXAMINATION – WINTER 2016

Subject Code:2141906 **Date:21/11/2016**

Subject Name:Fluid Mechanics

Time:02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

MARKS

Q.1 **Short Questions** **14**

1 Fluid is a substance which offers no resistance to change of
- a) Pressure
- b) Flow
- c) Shape
- d) Volume

2 In static fluid
- a) Resistance to shear stress is small
- b) Fluid pressure is zero
- c) Linear deformation is small
- d) Only normal stresses can exist

3 Property of fluid by which its own molecules are attracted is called
- a) Adhesion
- b) Cohesion
- c) Viscosity
- d) Surface tension

4 Mercury does not wet glass. This is due to property of liquid known as
- a) Adhesion
- b) Cohesion
- c) Viscosity
- d) Surface tension

5 A balloon lifting in sir follows the following principle
- a) Law of gravitation
- b) Archimedes principle
- c) Principle of buoyancy
- d) All of the above

6 The increase of temperature results in
- a) Decrease in viscosity of gas
- b) Increase in viscosity of liquid
- c) Decrease in viscosity of liquid
- d) None of above

7 Alcohol is used in manometer because
- a) It has low vapour pressure
- b) It is clearly visible
- c) It has low surface tension
- d) It can provide longer column due to low density.

8 The resultant upward pressure of a fluid on a floating body is equal to the weight of the fluid displaced by the body. This definition is according to

a) Buoyancy
b) Equilibrium of a floating body
c) Archimedes principle
d) Bernoulli's equation

9 Poise is the unit of

a) Surface tension
b) Capillarity
c) Viscosity
d) Shear stress in fluids

10 The unit of dynamic or absolute viscosity is

a) m^2/s
b) kg s/m
c) N-s/m
d) $N\text{-}s^2/m$

11 The horizontal component of buoyant force is

a) Negligible
b) Same as buoyant force
c) Zero
d) None of the above

12 During opening of a valve in a pipe line, the flow is

a) Steady
b) Unsteady
c) Uniform
d) Laminar

13 Pitot tube is used to measure

a) Pressure
b) Flow
c) Velocity
d) Discharge

14 For pipes, turbulent flow occurs when Reynolds number is

a) Less than 2000
b) Between 2000 and 4000
c) More than 4000
d) Less than 4000

Q.2	**(a)**	State advantages and limitation of manometer	**03**
	(b)	State Newton's law of viscosity and give an example.	**04**
	(c)	Explain with neat diagram construction and working of bourdon tube pressure gauge.	**07**
		OR	
	(c)	Explain with neat diagram construction and working of bellow and diaphragm pressure gauge.	**07**
Q.3	**(a)**	Explain Archimedes Principle.	**03**
	(b)	Explain total pressure and center of pressure.	**04**
	(c)	Derive an expression for calculating time period of oscillation of floating body.	**07**
		OR	
Q.3	**(a)**	Define gauge pressure, absolute pressure and atmospheric pressure.	**03**
	(b)	Write the practical significance of metacentric height.	**04**
	(c)	Explain different types of fluid flows.	**07**

Q.4	**(a)**	Define path line, stream line and streak line.	**03**
	(b)	Explain Eulerian frame of reference.	**04**
	(c)	Derive an equation for continuity equation for 3D flow and reduce it for steady, incompressible 2D flow.	**07**

OR

Q.4	**(a)**	Define dimensional analysis with an example.	**03**
	(b)	Explain different types of hydraulic models.	**04**
	(c)	Define vortex flow. Derive an expression of stream function and velocity potential function for vortex flow.	**07**
Q.5	**(a)**	What do you understand by frictional resistance offered by pipe?	**03**
	(b)	Derive Bernoulli's equation for adiabatic process in compressible fluid flow.	**04**
	(c)	Derive Hagen - Poiseullie equation stating the assumption made.	**07**

OR

Q.5	**(a)**	Define compressible and incompressible.	**03**
	(b)	Derive an equation for loss of head loss to sudden enlargement	**04**
	(c)	Derive Darcy-Weisbach equation for head loss due to friction in pipe flow.	**07**

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