GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-III (New) EXAMINATION - WINTER 2015

Subject Code:2130101 **Subject Name: Fundamental of Fluid Mechanics Time: 2:30pm to 5:00pm**

Date:02/01/2016

Total Marks: 70

Marks

14

Instructions:

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

Q.1 **Short Questions**

- 1. The cohesive forces are more in case of a)Liquid fluid b) gaseous fluid c) equal in both d) none of the above
- 2. For pipes, laminar flow occurs when Reynold's number is (a) < 2000(b) between 2000 and 4000(c) > 4000 (d) < 4000
- The length of the divergent portion of venturimeter in comparison to 3. convergent portion is
 - (a) more (b) less (c) same (d) less or more
- The centre of buoyancy of a submerged body is 4. (a) below CG of body (b) above CG of body (c) coincides with CG of body (d) none of the body
- Continuity equation deals with the law of conservation of 5. (a) energy (b) mass (c) momentum (d) all of the above
- Bernoulli's equation deals with the law of conservation of 6. (a) energy (b) mass (c) momentum (d) work
- The upper surface of a weir over which water flows is known as 7. (a) nappe (b) crest (c) edge (d) weir top
- The energy loss in flow through orifice as compared to venturimeter is 8. (a) same (b) less (c) more or less depending on flow (d) more
- 9. The streamlines are concentric circles for the (a) rotational flow (b) free vortex flow (c) uniform flow (d) streamline flow
- 10. Bunkingham pi-theorem, the number of pi-terms is (a) n-m (b) n+m (c) n (d) n/m
- The collar bearing is used to take up the of a rotating shaft. 11. (a) radial thrust (b) axial thrust (c) axial and radial thrust (d) none of the above
- 12. A low Reynold's number is indication of (a) effect of viscosity is less (b) effect of viscosity is more (c) effect of velocity is more (d) turbulent flow
- 13. Surface tension has the unit of (a) N/m^2 (b) N/m (c) N/m^3 (d) none of all
- 14. A piezometer tube is not suitable to measure (a) atmospheric pressure (b) negative pressure (c) positive pressure

		(d) all of the bove	
Q.2	(a)	Derive an expression for capillary rise (depression) between two	03
		vertical parallel plates.	
	(b)	Explain the following	04
		(1) Surface tension and capillarity	
		(2) Compressibility and bulk modulus	
	(c)	Derive the general equation of motion for vortex flow.	07
		OR	
	(c)	Derive an expression for the depth of paraboloid formed by the	07
		surface of a liquid contained in a cylindrical tank which is rotated at	
		a constant velocity about it vertical axis.	
Q.3	(a)	Explain total pressure and internal pressure.	03
	(b)	Explain Archimedes principle.	04
	(c)	Derive formula to determine Metacentric height using experimental	07
		method.	
Q.3	(\mathbf{a})	UK Differentiate real fluid and ideal fluids	02
	(a) (b)	Explain motion of fluid norticles	03
	(\mathbf{D})	Write a short note on Reynold's experiment	04
Q.4	(\mathbf{c})	List the assumptions made while deriving Bernoulli's equation	07
	(a) (b)	Compare venture meter and orifice meter	03
	(b) (c)	State and derive Bernoulli's equation	07
	(0)	OR	07
Q.4	(a)	Explain flow-net and state the importance of flow net.	03
	(b)	Derive an expression of stream function and velocity potential	04
	(~)	function for vortex flow.	
	(c)	State merits and demerits of two methods of dimensional analysis.	07
Q.5	(a)	Write a short note on kinetic energy correction factor.	03
	(b)	Explain Reynolds experiment with neat sketch.	04
	(c)	Derive the Hagen-Poiseullie equation stating the assumptions made.	07
		Sketch velocity and shear stress distribution in pipe flow.	
		OR	
Q.5	(a)	Define : (i) path line (ii) stream line (iii) stream tube	03
	(b)	Explain zone in action, zone of sclience, mach angle and mach-cone	04
		with the help of diagram.	
	(c)	Explain Saybolt Viscometer.	07