Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2160602 **Date: 01/05/2017**

Subject Name: Applied Fluid Mechanics

Time: 10:30 AM to 01:00 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 (Each question carries one mark)**	**14**
1	If dy/dx is greater than zero in the dynamic equation of Gradually Varied Flow i.e depth of flow increases in the direction of flow then type of profile of water is called as _____	
2	In non prismatic channel_____ is not possible (a) Unsteady flow (b) Non Uniform flow (c) Flow (d) Uniform flow	
3	The dimensions of the Darcy-Weisbach friction factor f are (a) MLT^{-2} (b) $M^0L^0T^0$ (c) $M^1L^0T^1$ ((d) None of these	
4	The head loss over finite length of the circular pipe with turbulent flow is depend on (a) Directly on flow velocity (b) Directly on pipe diameter (c) Directly on square of flow velocity (d) Inversely on cube of diameter.	
5	Shear stress in turbulent flow is due to (a) Surface tension (b) Density (c) Fluctuation of velocity (d) Specific gravity	
6	To produce a high head or discharge by multistage centrifugal pumps, the impellers are connected in _____	
7	If type of flow is in a channel is uniform then depth of the flow in the channel is called as _____depth.	
8	Who introduced the concept of boundary layer?	
9	A _____turbine can adjust both guide vane and blade angles according to rate of discharge.	
10	The specific speeds of Kaplan, Francis and Pelton wheel turbines are in the _____ order.	
11	For laminar flow of a fluid in a 400 mm diameter pipe with parabolic velocity distribution with maximum point velocity occurred at the centre of the pipe. If pressure gradient is 900 Pa/m, shear stress at 90 mm from the pipe wall is _____N/m^2.	
12	Define the critical depth and critical velocity.	
13	If the flow in the open channel is in critic al state, Froude number is equal to _____	
14	_____ of temperature causes a decrease in the viscosity of liquid and increases in the viscosity of gases.	

Q.2	**(a)**	Write the assumptions made in derivation of the Dynamic Equation of the Gradually varied flow.	**03**
	(b)	What are the differences between pipe flow and open channel flow? Also write the uses of pipes for hydraulic transmission of fluid.	**04**
	(c)	Derive the continuity equation for one dimensional flow and discuss its application.	**07**
		OR	
	(c)	What are the minor losses? Under what circumstances will they be negligible? Derive the expression for loss of head due to sudden contraction.	**07**
Q.3	**(a)**	Enlist the important applications of Navier-stoke equations.	**03**
	(b)	Describe Reynolds's experiment	**04**
	(c)	Derive an expression for the velocity distribution of viscous flow through a circular pipe and prove that the ratio of maximum velocity to average velocity is 2.	**07**
		OR	
Q.3	**(a)**	Define (i) Shear velocity (ii) Prandtl Mixing length (iii) Water Hammer	**03**
	(b)	Enlist the forces acting on Fluid in motion.	**04**
	(c)	Calculate the head loss due to friction using Darcy Equation and power required to maintain 50.3 liters per second of liquid flow through a steel pipe 0.1 m radius and 900 m long. Take Sp. Gravity of the liquid = 0.7 and co-efficient of friction f=0.0025.	**07**
Q.4	**(a)**	Explain in brief types of flow in open channel.	**03**
	(b)	Define the most economical channel section and Discuss the importance of it.	**04**
	(c)	A trapezoidal channel is 9.0 m wide and has a side slope of 1.5 horizontal: 1 vertical .The bed slope is 0.0004. The channel is lined with smooth concrete of n = 0.02. Compute the mean velocity and discharge for a depth of flow of 1.8 m.	**07**
		OR	
Q.4	**(a)**	Write the assumptions made in the derivation of Bernoulli's equation.	**03**
	(b)	Discuss the uses of the hydraulic jump.	**04**
	(c)	Derive the Chezy's and Manning's formula in case of open channel flow.	**07**
Q.5	**(a)**	Derive the expression for displacement thickness.	**03**
	(b)	Define (i) Displacement thickness (ii) Boundary layer thickness (iii) Laminar sub layer (iv) Laminar boundary layer	**04**
	(c)	Determine the dimensions of the following quantities (i) Shear Stress (ii) Angular velocity (iii) Angular acceleration (iv) Velocity (v) Discharge (vi) Work done and (vii) Power	**07**
		OR	
Q.5	**(a)**	Discuss the types of the similarities.	**03**
	(b)	Discuss the needs of good ventilation system and standards of ventilation.	**04**
	(c)	A Francis turbine of 1 metre runner diameter working under a head of 4.5 metres at a speed of 200 rpm develops 90 kW when the rate of flow of water is 1.8 m^3 /s. If the head on the turbine is increased to 13.5 metres determine the new speed ,discharge and power.	**07**

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