Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI EXAMINATION – SUMMER 2020

Subject Code: 2160602 Date:27/10/2020

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. **Draw sketch wherever necessary**
4. **Figures to the right indicate full marks**

Q.1	**(a)**	Determine the dimensions of : dynamic viscosity, torque and angular velocity	**03**
	(b)	Enlist the forces acting on fluied in motion	**04**
	(c)	Explain with diagrams how the main charecteristic curves for pumps are obtained and how they are useful in pump selection.	**07**
Q.2	**(a)**	Define : eddy viscosity, prandattl's mixing length, and shear velocity	**03**
	(b)	Give reasons why the expansion transition length in pipes are kept greater in comparison to contraction transition length.	**04**
	(c)	Expalin the Reynolds experiment for pipe flow with the help of sketch of the experimental set up and graph between head loss and Reynolds Number	**07**
		OR	
	(c)	Explain with diagram the specific energy curve for different discahrges and develop the expression for the minimum specific energy and state the charecteristics of flow in the critical state.	**07**
Q.3	**(a)**	Differentiate between drawdown and back water curve of GVF giving examples where they occur	**03**
	(b)	Discuss the utility of hydraulic jump	**04**
	(c)	A partially open sluice gate discharges water at 10 m/s with a depth of 50 cm in the horizontal rectnagular channel of width 10 meter.Find the pre hydraulic jmp Froude number and the height of the hydraulic jump that will occur under the given conditions.	**07**
		OR	
Q.3	**(a)**	State the assumptions made in the development of dynamic equation of gradually varied flow.	**03**
	(b)	.Develop the relationship between Maning's "n" and Chezy's "C" used for uniform steady flow	**04**
	(c)	Calculate the specific energy, critical depth and velocity for the flow of 10 m^3/s in a lined rectangular channel 2.5 meter wide with 2m depth of water. Find whether the flow is in sub critical or super critical state.	**07**
Q.4	**(a)**	Define developing and developed flow	**03**
	(b)	Explain why the development length for turbulent flow is much less compared to the development length required for a laminar flow.	**04**
	(c)	With the help of neat sketch describe the development of bounday layer over a flat plate.	**07**
		OR	
Q.4	**(a)**	Define and expalin the significance of laminar sub layer	**03**
	(b)	Define the concept of displacement thickness and develop an expression for the same.	**04**

	(c)	Discuss the means of separation control for flow past an aerofoil, around a pipe bend and flow around a sphere	**07**
Q.5	**(a)**	Explain the principle of dimensional homogenity. Give an example each of dimensionally homogeneous and non homogeneous equation.	**03**
	(b)	Define distotrted and undistorted models and give their utility	**04**
	(c)	A 10 cm diameter plate is to be rotated in water and a 25 cm diameter plate is to be rotated in air under dynamically similar conditions. Find the ratios of the torques required given that mass density of water and air respectively are 1000 kg/ m^3 / and 1.2 kg /m^3, dynamic viscosity of water and air are 0.001 Ns/m^2 and 1.8x 10^{-6} Ns/m^2 respectively.	**07**

OR

Q.5	**(a)**	Discuss the circumstances under which the pumps will be connected in series or parallel. Explain the resultant head and discahrges in the two cases	**03**
	(b)	Explain the scale effect in models	**04**
	(c)	In a 1:20 model of a stilling basin the height of the hydraulic jump and the energy dissipated in the model is 0.2 meter and 0.1 kilowatt respectively, find the corresponding values in the prototype.	**07**

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