Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY
Summer Examination-2017

Subject Name : Fluid Mechanics-I

Subject Code :4TE03FLM1 Branch : B.Tech (Civil)

Semester : 3 Date :31/03/2017 Time : 10:30 To 01:30 Marks :70

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) Define the Following Terms: 10
(I) Impact of Jet (II) Jet Propulsion (III) Newton's Law of Viscosity (IV) Buoyancy Force (V) Incompressible Flow (VI) Velocity Potential Function (VII) Forced Vertex Flow (VIII) Froude's Number (VIIII) Euler's Number (X) Reynold's number

b) Write the assumptions of Bernoulli's equation. 1

c) State the Bernoulli's theorem for steady flow of incompressible fluid. 1

d) The head of water over a rectangular notch is 900 mm. the discharge is 300 litres/s. Find the length of notch, when C_d=0.62 1

e) Enlist the methods of Dimensional Analysis. 1

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

a) Determine the total pressure and centre of pressure on an isosceles triangular plate of base 4m when it is immersed vertically in an oil of specific gravity 0.9. The Base of the plate coincides with the free surface of oil. **6**

b) Explain the term Meta center & meta-centric Height. What are the conditions of equilibrium of a floating body and submerged body? **8**

Q-3 **Attempt all questions** **(14)**

a) A U-Tube manometer is used to measure the pressure the pressure of water in a pipe line, which is in excess of atmospheric pressure. The right limb of the manometer contains mercury and is open to atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in level of mercury in the limbs of U-tube is 10 cm and the free surface of mercury is in level with the centre of the pipe. If the pressure of water in pipe line is reduced to 9810 N/m^2, Calculate the new difference in the level of mercury. Sketch the arrangements in both cases. **10**

	b)	A jet of water of diameter 75mm moving with a velocity of 30 m/s, strikes a curved fixed plate tangentially at one end at an angle of 30° to the horizontal. The jet leaves the plate at an angle 22° to the horizontal. Find the force exerted by the jet on the plate in the horizontal and vertical direction.	**4**
Q-4		**Attempt all questions**	**(14)**
	a)	Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.	**7**
	b)	Justify the statement, "In a convergent mouthpiece the loss of head is practically eliminated".	**7**
Q-5		**Attempt all questions**	**(14)**
	a)	In a 45° bend a rectangular air duct of 1 m^2 cross Sectional area is gradually reduced to 0.5 m^2 area. Find the magnitude and Direction of the force required to hold the duct in position if the velocity of flow at the 1m^2 section is 10 m/s, and pressure is 2.943 N/cm^2. Take Density of air as 1.16 kg/m^3.	**7**
	b)	Explaine the tem Co-efficient of velocity, Co-efficient of contraction & Co-efficient of discharge.Give the Classification of ORIFICES.	**7**
Q-6		**Attempt all questions**	**(14)**
	a)	Discuss the relative merits and demerits of venturimeter with respect to orifice-meter.	**5**
	b)	What is venturimeter? Derive an expression for discharge through a venturimeter.	**7**
	c)	A pitot-static tube is used to measure the velocity of water in a pipe. The stagnation Pressure head is 6m and static pressure head is 5m. Calculate the velocity of flow assuming the co-efficient of tube equal to 0.98.	**2**
Q-7		**Attempt all questions**	**(14)**
	a)	Derive the Expression for discharge over a triangular notch.	**7**
	b)	Differentiate followings: (I) Notches & Weir (II) Strem line & streak Line	**7**
Q-8		**Attempt all questions**	**(14)**
		Enlist and explain in details "minor head losses in pipes"	**14**