Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name: Fluid Mechanics - II
Subject Code: 4TE04FLM1 Branch: B.Tech (Civil)
Semester: 4 Date : 26/04/2018 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) Continuity equation is based on principle of ----------

b) Pipes of large diameters which carry water under pressure from the storage reservoir to the turbines are called as ----------

c) Centrifugal pump works on _____ force

d) _____ is a device which convert electrical energy into hydraulic energy

e) Number of fundamental dimensions are

f) a flow whose streamline is represented by a straight line, is called ---------- dimensional flow

g) Define specific energy.

h) In an ideal fluid ---------- is zero

i) Write the Chezy's formula for velocity of flow.

j) The flow change from super critical to subcritical it is called----------

k) Hagen-Poiseullie equation is applicable only in ---------- flow.

l) The Re is more than 2000 and less than 4000 is called --------- flow

m) Write Bernoulli's equation.

n) Abbreviate the term 'GVF'.

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

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

(a) A fluid flow field is given by $\vec{V} = (x^3y)\,\vec{i} + (2yxz - 4t)\,\vec{j} + (yz^2)\vec{k}$. Calculate the velocity and acceleration at the point (1, 2, 1) after 2 sec (t =1). **08**

(b) In a two dimensional flow through a channel, the fluid velocity components are given by u = 2xy – 4x, v = x -4xy. Determine the velocity potential function and **06**

stream function

Q-3		**Attempt all questions**	**(14)**
	(a)	A 45 cm diameter pipe, conveying water, branches into two pipes of diameters 30 cm and 25 cm respectively. If the average velocity in the 45 cm pipe is 3 m/s. Find the discharge in this pipe. Also determine the velocity in 25 cm pipe if the average velocity in 30 cm pipe is 2 m/s.	**06**
	(b)	Derive the Bernoulli's equation from Euler's equation of motion.	**04**
	(c)	What are the differences between pipe flow and open channel flow? Describe.	**04**
Q-4		**Attempt all questions**	**(14)**
	(a)	Compute the discharge through a rectangular channel of width 3.2 m and depth of flow 1.1 m, laid at a bed slope of 0.0002. Take Chezy's constant C = 45	**04**
	(b)	Explain the occurrence and shape of different surface water profiles	**05**
	(c)	A rectangular channel carries a discharge of 18 cumecs with pre-jump depth of 0.9 m. The width of channel is 6m. If the hydraulic jump forms on downstream side calculate the post-jump depth and energy loss.	**05**
Q-5		**Attempt all questions**	**(14)**
	(a)	Explain the types of models.	**06**
	(b)	The efficiency η ($M^0L^0T^0$) of a fan depends on the density ($\rho = ML^{-3}$), dynamic viscosity ($\mu = ML^{-1}T^{-1}$) of the fluid, the angular velocity ($\omega = T^{-1}$) diameter (D=L) of the rotor and the discharge ($Q = L^3T^{-1}$). Express η in terms of dimensionless parameters.	**08**
Q-6		**Attempt all questions**	**(14)**
	(a)	What are the types of similitude? Explain any two of them.	**07**
	(b)	Enlist the forces acting on Fluid in motion.	**04**
	(c)	Explain moody diagram.	**03**
Q-7		**Attempt all questions**	**(14)**
	(a)	An oil of viscosity 0.1Ns/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and of length 300 m. The rate of flow of fluid through the pipe is 3.5 l/s. Find the pressure drop in a length of 300 m.	**07**
	(b)	Calculate the critical depth and critical velocity of water flowing in a rectangular channel of width 4 m carrying a discharge of 12 m^3/s. Also calculate minimum specific energy.	**07**
Q-8		**Attempt all questions**	**(14)**
	(a)	Discuss in detail the working principle of Pelton wheel turbine.	**08**
	(b)	Explain in detail the working principle of reciprocating pump with neat sketch.	**06**