Enrollment No: _____   Exam Seat No:_____

C.U.SHAH UNIVERSITY
Winter Examination-2015

Subject Name: Fluid Mechanics.
Subject Code: 4TE04FME1
Branch: Automobile Engineering/Mechanical Engineering
Semester: 4   **Date: 19/11/2015**
Time :2:30 to 5:30   **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) The mass per unit volume of a liquid at a standard temperature and pressure is
         called as
         a) specific weight   b) Mass density
         c)specific gravity   d) None of these
  b) The unit of surface tension
         a) N/m   b) N/m^2
         c) N/m^3 d) N-m
  c) A manometer is used to measure
         a) Low pressure   b) Moderate pressure
         c) High pressure   d) Atmospheric pressure
  d) According to equation continuity
         a) w1a1= w2a2   b) w1v1= w2v2
         c) a1v1= a2v2   d) a1/v1= a2/v2
  e) Bernoulli's equation is applied to
         a) Venturimeter   b) Orifice meter
         c) Pitot tube   d) All of these
  f) An opening in the side of the tank or vessel such that the liquid surface with the
         tank below the top edge of the opening is called
         a) Weir   b) Notch
         b) Orifice   d) None of these
  g) Newton's law of viscosity is a relationship between
         a) pressure, velocity and temperature b) shear stress and rate of shear strain
         c)shear stress and velocity   d) rate of shear strain and temperature
  h) The unit of kinematic viscosity is
         a) N-m/s   b)N-s/m2
         c) m^2/s   d) N-m
  i) Water is a……………….. fluid
         a) Real   b) Ideal
         c)Newtonian   d) Non- Newtonian
  j) The velocity at which the flow is change from laminar flow to turbulent flow is

called
a) critical velocity
b) velocity of approach
c) sub sonic velocity
d) super sonic velocity

k) The flow in pipe is laminar when
a) Less than 2000
b) Between 2000 to 4000
c) More than 4000
d) None of these.

l) In a foot step bearing, if the speed of the shaft is doubled, then the torque required to overcome the viscous resistance will be
a) Double
b) Four times
c) Eight times
d) Sixteen times.

m) A flow through a long pipe at constant rate is called
a) steady uniform flow
b) steady non uniform flow
c) Unsteady uniform flow
d) Unsteady non uniform flow

n) The ratio of inertia force to viscous force is called
a) Froude number
b) Raynolds number
c) Weber's number
d) Mach number

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

Q-2 **Attempt all questions**
a) State the application of fluid mechanics. And give the difference between solid and fluid. **05**
b) Define capillary action in detail and derive the equation for capillary rise. **05**
c) A flat plate of area 2.5×10^6 mm^2 is pulled with the speed of 0.4 m/s relative to another plate locates at a distance of 0.15mm from it. Find the force and power required to maintain this speed, if the fluid separating them is having viscosity as 1 poise. **04**

Q-3 **Attempt all questions**
a) Derive equation for Pascal's law. **07**
b) Classify pressure measuring device. Explain U tube manometers with a neat sketch. **07**

Q-4 **Attempt all questions**
a) Define buoyancy and explain the stability condition for floating body. **05**
b) Explain the analytical method for the measurement Metacenter height. **05**
c) A metallic body floats at a interface of mercury and water such that 32% of volume is submerged in mercury and 68% in water. Calculate density of metal. **04**

Q-5 **Attempt all questions**
a) Give the name of types of flow. Explain any three with neat sketch. **05**
b) Derive the continuity equation with assumptions. **05**
c) The velocity component in a steady flow are u=2kx, v=2ky, w= -4kz. What is equation of streamline passing through the point (1, 0, 1). **04**

Q-6 **Attempt all questions**
a) Derive Bernoulli's equation with its assumption. **05**
b) Differentiate the following. **05**
1) Venturimeter and Orificemeter.

2) Notches and Weirs.

c) The head of water over the center of the orifice of diameter 20 mm is 1 meter. The actual discharge through the orifice is 0.85liter/second. Find the C_d.   **04**

Q-7   **Attempt all questions**
a) Explain the Reynolds experiment with a neat sketch.   **05**
b) Write short note on movement of piston in a dashpot.   **05**
c) An oil density 917 kg/m^3 is being pumped in a15 cm diameter pipe. The discharge is measured as 850 L/min. the drop in pressure in a stretch of 800 m of a pipeline, both ends of which are at the same elevation, is measured as 95kpa. Estimate the absolute viscosity of the oil.   **04**

Q-8   **Attempt all questions**
a) What is Mach number and give its signification.   **05**
b) Derive one dimensional flow Bernoulli's equation for adiabatic process.   **05**
c) Find the velocity of a bullet fired in a standard air if Mach angle is 30 degree. Take R=287J/Kg ^{0}k, K=1.4 and T=15 ^{0}C.   **04**