# PARUL UNIVERSITY
## FACULTY OF AGRICULTURE
### B.Tech. Agriculture Engineering, Summer 2018 - 19 Examination

**Semester: 2**                                                          **Date: 19/04/2019**
**Subject Code: 20103155**                                    **Time: 2:00pm to 4:00pm**
**Subject Name: Fluid Mechanics and Open Channel Hydraulics**          **Total Marks: 50**

**Instructions**
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1**

**A)** **Fill in the blanks (Each of 0.5 Mark)**                                              **(05)**

   i)       _____   is unit of surface tension

   ii)      The Dynamic viscosity is_____

   iii)     Unit of weight density is_____

   iv)     The unit of pressure is_____

   v)      An ideal fluid has _____ viscosity.

   vi)     The value of acceleration due to gravity is_____

   vii)    The Specific gravity is_____

   viii)   The unit of shear stress is_____

   ix)     The Steady flow is  _____

   x)      The Reynolds number in pipe for turbulent flow is_____

**B)** **Multiple Choice Questions (Each of 0.5 Mark)**                                       **(10)**

   i)       If density of fluid is constant from point to point in a flow region it is called

            (a) Rotational      (b) Incompressible      (c) Compressible      (d) None.

   ii)      The unit of force is

            (a) Newton  (b) Newton-sec (c) (Meter)2   (d) Newton/Meter

   iii)     Continuity equation deals with the law of conservation of

            (a) Flow        (b) Mass    (c) Density        (d) Energy

   iv)     Orifice meter is used to measure

            (a) Rate of flow  (b) Velocity    (c) Pressure      (d) None

   v)      Pitot tube is used to measure

            (a) Rate of flow  (b) Velocity   (c) Pressure       (d) None

vi)     The application of Bernoulli's theorem is

(a) Venturimeter  (b) Orifice Meter    (c) Both      (d) None

vii)    If density of fluid is not constant from point to point in a flow region it is called

(a) Rotational      (b) Incompressible     (c) Compressible    (d) None

viii)   The Reynolds number in pipe for laminar flow is

(a) 5000        (b) less than 2000     (c) more than 4000    (d) None

ix)     The Density of water is

(a) 1000      (b) 2000     (c) 13600    (d) 5000

x)      The specific gravity of mercury is

(a) 1      (b) 2     (c) 13.6    (d) 5

xi)     The device is used for measurement of static pressure at point

(a) Venturimeter      (b) Orifice meter    (c) Pitot Tube    (d) Manometer

xii)    The unit of velocity is

(a) m/s      (b)  m   (c) s    (d)  $m/s^2$

xiii)   The unit of discharge is

(a) m/s      (b)  $m^3/s$   (c) s    (d)  $m/s^2$

xiv)    The forced vortex is

(a) Momentum      (b)  Velocity   (c) Angular Momentum    (d)  None

xv)     The Chezy's Formula is

(a) $V = C(mi)^{0.5}$      (b)  $V = C(mi)$   (c) $V = C(mi)^{0.2}$      (d)  $V = C(mi)^{0.9}$

xvi)    The pressure difference between two points is measured by

(a) Venturimeter (b)  Differential Manometer (c) Pitot Tube  (d) Manometer

xvii)   The unit of kinematics viscosity is

(a) Poise (b)  Newton (c) Stokes  (d) None

xviii)  The Bernoulli's theorem is conservation of

(a) Flow      (b) Mass    (c) Density      (d) Energy

xix)    The basic dimension of Fluid Mechanics is

(a) 3      (b) 2   (c) 1      (d) 0

xx)     If fluid is constant in space it is called

(a) Uniform flow      (b) Steady Flow     (c) Compressible    (d) None.

**Q.2**

**A)** **Define the following (Any five out of seven questions)** (05)
   (1) Define Fluid Mechanics?
   (2) Define Pascal's Law?
   (3) Define Hydrostatic Law?
   (4) Define Surface Tension?
   (5) Define Metacenter?
   (6) Define Buoyancy?
   (7) Define basic principles of hydraulic jump?

**B)** **Answer the following (Any five out of seven questions)** (05)
   (1) What is Dynamic Viscosity?
   (2) What is center of pressure?
   (3) What is vortex flow?
   (4) What are hydraulic machines?
   (5) What is turbulent flow?
   (6) What is specific energy?
   (7) What is open channel flow?

**Q.3** **Write Short notes (Any five out of six questions)** (10)
   (1) Explain in brief various losses in pipes.
   (2) What is Capillarity? Write its expression for rise & fall.
   (3) Explain the various types of fluid properties.
   (4) Calculate the specific weight, density & specific gravity of one liters of a liquid which has weight 7N.
   (5) Classify the types of flow.
   (6) State Newton's Law of Viscosity.

**Q.4** **Long Questions (Any three out of four questions)** (15)
   (1) Derive the Bernoulli's equation & write it is assumption.
   (2) A rectangular plate 2m wide and 5m long is immersed in water in such a way as vertically , 2m side is parallel to the water surface and 1 m below the free surface of water. Evaluate (a) Total pressure on the plate (b) Position of center of pressure.
   (3) A 30cm diameter pipe, conveying water, branches into two pipes of diameter s 20 cm & 15 cm respectively. If the velocity in the 30 cm diameter is 2.5 m/s, find the discharge in this pipe. Also determine the velocity in 15 cm pipe if the velocity in 20 cm diameter pipe is 2 m/s.
   (4) Find the volume of the water displaced and position of center of buoyancy for a wooden block of width 2.5m and depth 1.5m, when it floats horizontally in water the density of wooden block is 650 kg/m$^3$ and its length 6m.