

Seat No: _____

Enrollment No: _____

PARUL UNIVERSITY
FACULTY OF AGRICULTURE
B.Tech Agriculture Winter 2019 - 20 Examination

Semester: 2

Subject Code: 20103155

Subject Name: Fluid Mechanics and Open Channel Hydraulics

Date: 14/12/2019

Time: 10:30 am to 12:30 pm

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) The Reynolds number in pipe for laminar flow is _____
- ii) The unit of pressure is _____
- iii) The unit of shear stress is _____
- iv) The Dynamic viscosity is _____
- v) A real fluid has _____ viscosity.
- vi) The value of acceleration due to gravity is _____
- vii) The Specific gravity of mercury is _____
- viii) Unit of weight density is _____
- ix) The unsteady flow is _____
- x) _____ is unit of Force.

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

- i) The application of Bernoulli's theorem is
(a) Venturimeter (b) Orifice Meter (c) Both (d) None

- ii) The unit of velocity is
(a) m/s (b) m (c) s (d) m/s^2
- iii) The Reynolds number in pipe for turbulent flow is
(a) 5000 (b) less than 2000 (c) more than 4000 (d) None
- iv) Orifice meter is used to measure
(a) Rate of flow (b) Velocity (c) Pressure (d) None
- v) Continuity equation deals with the law of conservation of
(a) Flow (b) Mass (c) Density (d) Energy
- vi) 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.
- 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) Pitot tube is used to measure
(a) Rate of flow (b) Velocity (c) Pressure (d) None
- ix) The Density of water is
(a) 1000 (b) 2000 (c) 13600 (d) 5000
- x) The specific gravity of water 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 surface tension is
(a) Newton (b) Newton-sec (c) (Meter)² (d) Newton/Meter
- 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) If fluid is constant in space it is called
(a) Uniform flow (b) Steady Flow (c) Compressible (d) None
- 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) The Chezy's Formula is
(a) $V = C(mi)^{0.5}$ (b) $V = C(mi)$ (c) $V = C(mi)^{0.2}$ (d) $V = C(mi)^{0.9}$

Q.2

A) Define the following (Any five out of seven questions) (05)

- (1) Define Fluid Mechanics?
- (2) Define Metacenter
- (3) Define Hydrostatic Law?
- (4) What is open channel flow?
- (5) What is turbulent flow?
- (6) Define basic principles of hydraulic jump?
- (7) Define Buoyancy force?

B) Answer the following (Any five out of seven questions) (05)

- (1) What is Capillarity?
- (2) What is center of pressure?

- (3) What is vortex flow?
- (4) What is Dynamic Viscosity?
- (5) Define Pascal's Law?
- (6) What is specific energy curve?
- (7) Define Surface Tension

Q.3 Write Short notes (Any five out of six questions) (10)

- (1) Explain in brief various losses in pipes.
- (2) What are hydraulic machines?
- (3) State Newton's Law of Viscosity.
- (4) Calculate the specific weight, density & specific gravity of 1.5 liters of a liquid which has weight 10 N.
- (5) Classify the types of flow.
- (6) Explain the various types of fluid properties.

Q.4 Long Questions (Any three out of four questions) (15)

- (1) A 30cm diameter pipe, conveying water, branches into two pipes of diameter s 18 cm & 16 cm respectively. If the velocity in the 30 cm diameter is 3 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 2.5 m/s.
- (2) Find the volume of the water displaced and position of center of buoyancy for a wooden block of width 3m and depth 2 m, when it floats horizontally in water the density of wooden block is 670 kg/m^3 and its length 6m.
- (3) Derive the Bernoulli's equation & write it is assumption.
- (4) A rectangular plate 3m wide and 6m long is immersed in water in such a way as vertically , 3m 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.