

**PARUL UNIVERSITY**  
**FACULTY OF AGRICULTURE**  
**B.Tech. (Dairy Technology), Winter 2019-20 Examination**

Semester : 1  
Subject Code : 20104102  
Subject Name : Fluid Mechanics

Date : 28-11-2019  
Time : 10:30 am to 12:30 pm  
Total Marks : 50

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**INSTRUCTIONS:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start answer of new question on new page.
5. Use properties table/chart, if necessary.

**Q.1 A) Fill in the blanks (Each of 0.5 Mark) (05)**

- (1) The sum of suction head and discharge head of a pump is called its .....
- (2) When the pressure is measured above absolute zero it is called .....
- (3) According to the Bernoulli's theorem, the total energy of fluid is the sum of Kinetic energy, Potential energy and ..... energy
- (4) The ratio of mass flow rate to the volumetric flow rate of a fluid gives .....
- (5) When actual discharge of a pump is more than the theoretical discharge then the pump is said to have ..... slip
- (6) The point on the body through which all the force of buoyancy is said to act is called its .....
- (7) Reynold's number is the ratio of inertial force to .....
- (8) Unit of kinematic viscosity is .....
- (9) In case of water in a capillary, if the adhesion is greater than cohesion, we get .....meniscus (concave/convex)
- (10) Pitot tube is used to measure the .....

**Q.1 B) Choose the correct answer from the alternatives given (Each of 0.5 Mark) (10)**

- i) Which of the following is not a pressure measuring device?
  - a. Piezometer
  - b. Pyrometer
  - c. Bourdon tube
  - d. U-tube
- ii) Which of the following is not true for a reciprocating pump?
  - a. It can handle high manometric head
  - b. It consumes more energy than equivalent centrifugal pump
  - c. It gives non pulsating uniform flow
  - d. Both b and c
- iii) The Bernoulli's principle applies truly on
  - a. Incompressible fluid flowing in closed conduit
  - b. Incompressible fluid flowing in open conduit
  - c. Compressible fluid flowing in closed conduit
  - d. Compressible fluid flowing in open conduit
- iv) Which of the following instruments is the most sensitive?
  - a. Simple manometer
  - b. U-tube manometer
  - c. Micro manometer
  - d. Differential manometer
- v) The Chezy's formula for liquid discharge through pipe is

- a.  $C\sqrt{mi}$
- b.  $C_v \times C_c$
- c.  $\sqrt{2gh}$
- d.  $C\sqrt{v^2mi}$

- vi) The property of liquid by virtue of which it resists to flow is called as
  - a. Critical velocity
  - b. Viscosity
  - c. Mass density
  - d. Capillarity
- vii) The heavy liquid commonly used in the U-tube manometers is
  - a. Alcohol
  - b. Mercury
  - c. Kerosene
  - d. Brine
- viii) .....is the ratio of actual velocity at vena contracta to the velocity of the jet
  - a. Coefficient of discharge
  - b. Coefficient of velocity
  - c. Coefficient of area
  - d. None of the above
- ix) This joint is mostly preferred for high pressure lines
  - a. Coupling
  - b. Union
  - c. Flange
  - d. Nipple
- x) This dimensionless number is useful to differentiate between laminar flow and turbulent flow
  - a. Weber number
  - b. Mach number
  - c. Reynold number
  - d. Biot number
- xi) The ratio of the density of a liquid to the density of a standard liquid (water) is called
  - a. specific weight
  - b. specific mass
  - c. specific density
  - d. specific gravity
- xii) The kinematic viscosity is the ratio of
  - a. mass to volume
  - b. absolute viscosity to density
  - c. absolute viscosity to mass
  - d. absolute viscosity to volume
- xiii) Anything that can flow is called as fluid. The fluid may be
  - a. liquid only
  - b. gas only
  - c. liquid or gas
  - d. solid
- xiv) The pipe fitting which is used to connect a branch line to main pipeline is
  - a. tee
  - b. union
  - c. flange

- d. nipple
- xv) Which of the following is useful in liquid flow measurement
- Venturimeter
  - Notch
  - Weir
  - All of the above
- xvi) The dimensions of pressure are
- $M^1L^1T^{-2}$
  - $M^1L^{-1}T^{-2}$
  - $M^1L^1T^{-1}$
  - $M^1L^2T^{-2}$
- xvii) Simple manometer can not measure
- gauge pressure
  - absolute pressure
  - negative pressure
  - positive pressure
- xviii) According to Pascal law, the intensity of pressure at all points in the liquid
- decreases toward the center
  - increases toward the center
  - remains same
  - none of these
- xix) Actual discharge through an orifice is equal to theoretical discharge
- multiplied by coefficient of discharge
  - divided by coefficient of discharge
  - multiplied by coefficient of velocity
  - multiplied by coefficient of area
- xx) Venturimeter is an important fluid handling device working on the principle of
- continuity equation
  - Bernoulli's theorem
  - Pascal's law
  - None of these

**Q.2 A) Define the following (Any five) (05)**

- Fluid
- Pressure
- Centre of gravity
- Flow rate
- Specific gravity
- Compressibility of fluid

**Q.2 B) Answer the following (Any five) (05)**

- What do you mean by the term 'fluid'?
- Can the simple manometer measure negative pressure (vacuum) ?
- State the relation between absolute pressure, gauge pressure and atmospheric pressure.
- What is the unit of surface tension?
- Which heavy fluid is used in the U-tube manometer?
- State the dimensions of velocity.
- Which type of pump do not require priming ?

**Q.3 Write short notes on the following (Any five) (10)**

- Slip of a pump
- Buckingham's theorem
- Orifice meter

- (4) Archimedes law
- (5) Manometric efficiency of a pump
- (6) Surface tension

**Q.4 Answer the following in detail (Any three)**

**(15)**

- (1) Explain the Bernoulli's theorem. Describe the working of venturimeter with the help of neat sketch.
- (2) Enlist pressure measuring devices and explain the any one in detail. State advantages of micromanometer over simple manometer.
- (3) A reciprocating pump having cylinder diameter of 25 mm and stroke length of 30 mm is used to suck the water from a depth of 2 m and deliver at a height of 102 m above the pump. The speed of pump is 200 rpm and density of water is  $998 \text{ kg/m}^3$ . Find the work done by the pump.
- (4) Describe the uses of centrifugal pump in milk processing plant.
- (5) Describe various pipe fittings and joints.