

MAHARASHTRA ANIMAL AND FISHERY SCIENCES UNIVERSITY, NAGPUR
SEMESTER END THEORY EXAMINATION, B. Tech. (D.T.)

Semester	: I (V Dean)	Academic Year	: 2021-2022
Course No.	: DE-102	Course Title	: Fluid Mechanics
Credits	: 2+1=3	Total Marks	: 50
Day & Date	: Thursday, 19/05/2022	Time	: 02:30 hrs

- Note :**
- 1) All questions from **Section 'A'** are compulsory.
 - 2) Solve **Any Three** questions from **Section 'B'**.
 - 3) Draw neat and well labelled diagram wherever necessary.

SECTION – 'A'

- Q. 1 A) Choose the most appropriate answer from the options given below. (05)
- i) Flow velocity at Vena Contracta is determined by applying
 - a) Lenz Theorem
 - b) Newton's Theorem
 - c) Fourier's Theorem
 - d) Bernoulli's theorem
 - ii) Chezy's formula is used to calculate
 - a) Pressure
 - b) Flow velocity
 - c) Flow rate
 - d) Pressure drop
 - iii) The difference of pressure between two points in a pipe line is measured by using
 - a) Rotameter
 - b) Piezometer
 - c) Differential manometer
 - d) Simple manometer
 - iv) Phenomenon of rise or fall of a liquid surface in a small tube relative to the adjacent general level of liquid when tube is held vertically in the liquid is called
 - a) Density
 - b) Viscosity
 - c) Capillarity
 - d) Surface Tension
 - v) Study of fluid in motion without considering the forces causing the motion is known as
 - a) Fluid Statics
 - b) Fluid Kinetics
 - c) Fluid Dynamics
 - d) None of above
- B) Define the following: (05)
- i) Ideal Fluid
 - ii) Reynold's Number
 - iii) Coefficient of discharge
 - iv) Uniform flow
 - v) Slip of pump
- Q. 2 A) Give reasons for the following. (05)
- i) An air vessel (chamber) is provided in suction and/ or discharge line of reciprocating pump.
 - ii) During emptying of a milk tank under gravity without filling, the flow rate of milk reduces over a period of time.
 - iii) When fluid flow through straight pipe, head loss occurs.
 - iv) Weber number is used in flow through capillary.
 - v) For measurement of discharge through notch, triangular notch is preferred.

(P.T.O.)

- B) State whether True or False. If false, rewrite the statement after making necessary corrections. (05)
- i) Piezometer gives only gauge pressure.
 - ii) Weir is provided in small channel and fabricated from metal.
 - iii) Absolute pressure is the sum of atmospheric pressure and gauge pressure.
 - iv) Dimensions of kinematic viscosity is ML^2T^{-1} .
 - v) Bernoulli's principle is applicable for uniform flow.

SECTION - 'B'

- Q. 3 A) Discuss the various types of losses due to friction in liquid fluid flow through a pipeline. (05)
- B) Write a short note on dimensional analysis. (05)
- Q. 4 A) Enlist the different parts and discuss the working of a centrifugal pump with neat sketch. (05)
- B) The right limb of a simple U-tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe in which a fluid of sp.gr. 0.93 is flowing. The centre of the pipe is 10 cm below the level of mercury in right limb. Find the pressure of fluid in the pipe if the difference of mercury level in two limbs is 20 cm (assume the data wherever necessary). (05)
- Q. 5 A) State Bernoulli's theorem with its limitations. (03)
- B) Find the discharge of water flowing over a rectangular weir of 1.5 m length when the constant head over the notch is 500 mm. Take $C_d=0.62$. (03)
- C) Derive an equation for determining the time required for emptying tank having orifice with unit dimensions. (04)
- Q. 6 A) Determine the velocity of fluid flow having mass flow rate 10,000 kg/hr and diameter 50 mm (Density of fluid is 1000 kg/m^3). (03)
- B) Give the difference between rotational and irrotational flow. (03)
- C) A double acting single cylinder reciprocating pump, running at 55 rpm, is discharging 800 liters of water per minute. The pump has a stroke of 400 mm. The diameter of piston is 250 mm. The delivery and suction heads are 25 m and 5 m respectively. Find the slip of the pump and power required to drive the pump (04)
- Q. 7 Explain construction and working of reciprocating pump with neat sketch. Also, write its applications in dairy industry. (10)
