

Total No. of printed pages = 5

END SEMESTER EXAMINATION – 2020

Semester : 4th

Subject Code : FPT-401

ELEMENTS OF FOOD ENGINEERING-II

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Instructions :

1. All questions of PART-A are compulsory.
2. Answer any five questions from PART-B.

PART – A

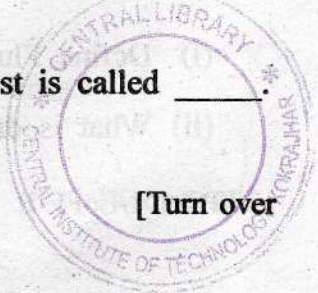
Marks – 25

1. Fill in the blanks : $1 \times 5 = 5$

(i) Weight density of water is, $\rho_{\text{water}} = \frac{\text{N}}{\text{m}^3}$ = _____

(ii) The study of fluids at rest is called _____.

[Turn over



(iii) A fluid, which possesses viscosity, is known as _____.

(iv) Discharge, $Q = \text{_____} \times \text{_____}$.

(v) In case of circular pipe if Reynold's number $R_e < 2000$, the flow is said to be _____.

2. Write true or false : 1×5=5

(i) One stoke = $10^{-4} \frac{\text{m}^2}{\text{s}}$.

(ii) Specific volume = $\frac{\text{Volume of fluid}}{\text{Weight of fluid}}$.

(iii) Tubulent flow is that type of flow in which the fluid particles move along well-defined paths.

(iv) The mass of water vapour present in 1 kg of dry air is called Humidity.

(v) Reciprocating pumps are mostly used for domestic purposes.

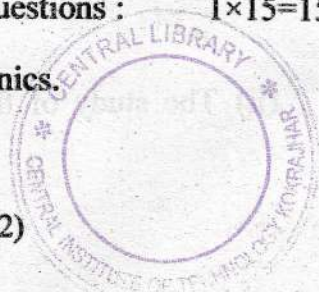
3. Answer the following questions : 1×15=15

(i) Define Fluid Mechanics.

(ii) What is dry air?

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(2)

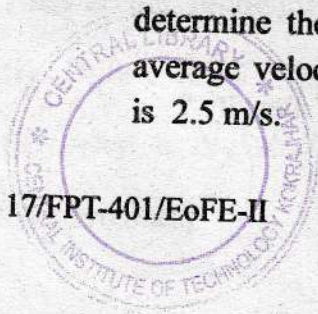


- (iii) Define Laminar flow.
- (iv) State Bernoulli's equation.
- (v) What is Specific gravity ?
- (vi) Write down the Euler's equation.
- (vii) Write the mathematical expression of Newton's law of Viscosity.
- (viii) Why food preservation is needed ?
- (ix) What is Psychrometry ?
- (x) Compare Steady and Unsteady flow.
- (xi) What is dry bulb temperature ?
- (xii) Define Discharge.
- (xiii) Write down the Cezy's equation for loss head due to friction in pipes.
- (xiv) Define SFEE.
- (xv) What is the SI unit of density ?

PART -- B

Marks -- 45

1. (a) State Continuity Equation and derive the mathematical expression. 6
(b) Establish a relationship between SI unit and CGS units of viscosity. 3
2. (a) Define mass transfer coefficient. 4
(b) Explain Fick's law of diffusion. 5
3. (a) State the various methods of food preservation. 4
(b) Explain the application of refrigeration for food preservation. 5
4. (a) A 30 cm diameter pipe, conveying water, branches into two pipes of diameters 20 cm and 25 cm respectively. If the average velocity in the 30 cm diameter pipe is 3 m/s, find the discharge in this pipe. Also determine the velocity in 25 cm pipe if the average velocity in the 20 cm diameter pipe is 2.5 m/s. 6



- (b) Calculate the specific weight, density and specific gravity of one litre of a liquid which weighs 8N. (Density of water 1000 kg/m^3 , $1\text{L} = 10^{-3} \text{ m}^3$). 3
5. (a) A flat plate of area $1.5 \times 10^6 \text{ mm}^2$ is pulled with a speed of 0.5 m/s relative to another plate located at a distance of 0.2 mm from it. Find the force and power required to maintain this speed, if the fluid separating them is having viscosity as 1 poise. 6
- (b) Water is flowing through a pipe of 7 cm diameter under a pressure of 30 N/cm^2 (gauge) and with mean velocity of 2 m/s. Find the total head or total energy per unit weight of the water at a cross-section, which is 7m above the datum line. 3
6. Write short notes on : 3×3=9
- (a) Reynolds number
- (b) Newtonian and Non-Newtonian fluids
- (c) Difference between Centrifugal and Reciprocating pump.

