

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

Semester	: VI (V Dean)	Academic Year	: 2021-2022
Course No.	: DE-612	Course Title	: Food Engineering
Credits	: 2+1=3	Total Marks	: 50
Day & Date	: Friday, 13/05/2022	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) Force with which a material fractures is known as
 - a) Stiffness
 - b) Hardness
 - c) Fracturability
 - d) Cohesiveness
- ii) Rate at which a material returns to its original condition is known as
 - a) Stiffness
 - b) Adhesiveness
 - c) Springiness
 - d) Resilience
- iii) The force necessary to attain a given deformation is known as
 - a) Stringiness
 - b) Springiness
 - c) Hardness
 - d) Resilience
- iv) The extent to which a material can be deformed before it ruptures:
 - a) Cohesiveness
 - b) Strength
 - c) Toughness
 - d) Creep
- v) The energy required to disintegrate a semisolid food to a state ready for swallowing is called as
 - a) Stiffness
 - b) Brittleness
 - c) Chewiness
 - d) Gumminess

B) State the values of flow behavior index for the following fluid types. (05)

- i) Pseudoplastic
- ii) Newtonian
- iii) Casson's model
- iv) Dilatant
- v) Bingham Plastic

Q. 2 A) Do as directed. (05)

- i) Convert 60% moisture content (wet basis) to dry basis moisture content.
- ii) Express 840 cP viscosity in SI unit.
- iii) State the boiling point of liquid nitrogen at atmospheric pressure.
- iv) State the water activity value at which the food becomes susceptible to mold growth.
- v) State the eutectic point of a solution of common salt in water.

(P.T.O.)

- B) Explain in one sentence. (05)
- i) Critical moisture content
 - ii) Thermal centre
 - iii) Eutectic point
 - iv) Tonnes of Refrigeration
 - v) Sublimation drying

SECTION - 'B'

- Q. 3 A) Enumerate different types of industrial freezers. Explain the Air Blast freezer in detail with sketch. (05)
- B) Enumerate different types of food dryers. Explain the Cabinet dryer in detail with sketch. (05)
- Q. 4 A) Explain the process of food freezing in detail with sketch. (05)
- B) Explain the process of food drying in detail with sketch. (05)
- Q. 5 A) Write in brief about freeze drying methods and its advantages. (03)
- B) Estimate the freezing point depression of an 18% solution of glucose in water, using Raoult's Law. (03)
- C) Estimate the drying time for a food product from 80% initial moisture content to 6% final moisture content, if the critical moisture content is observed at 57.5 moisture content after 6.5 minutes of drying. (04)
- Q. 6 A) Explain: Blanching. State its advantages and disadvantages. (03)
- B) Write short notes on: a) Pulping b) Size Reduction (03)
- C) A spherical food, 4 cm in diameter, is to be frozen by air blast at -18°C having convective heat transfer coefficient of $50 \text{ W/m}^2\cdot\text{K}$. The frozen food product has a density of 980 kg/m^3 and thermal conductivity of $1.1 \text{ W/m}\cdot\text{K}$. The initial freezing point of the food is -1.2°C and the amount of heat to be removed is 250 kJ/kg . Estimate the freezing time, using Plank's equation. (04)
- Q. 7 Explain the term: Rheology. State its importance in the food industry. Enumerate and explain the rheological behavior of different types of foods. (10)
