

**FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, NOVEMBER 2020**

(CBCSS)

Food Science and Technology

FST 1C 04—BASIC PRINCIPLES OF ENGINEERING

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend **all** questions in each section.*
2. *The minimum number of questions to be attended from the Section / Part shall remain the same.*
3. *There will be an overall ceiling for each Section / Part that is equivalent to the maximum weightage of the Section / Part.*

Part A

*Write short on **four** out of seven of the following questions.
Each question carries 2 weightage.*

1. Basic units under SI system.
2. Zeroth law of thermodynamics.
3. Degree of saturation.
4. Hydrodynamic lubrication.
5. Package boiler.
6. Globe valve.
7. Ton of Refrigeration.

(4 × 2 = 8 weightage)

Part B

*Write short essays on any **four** out of seven of the following.
Each question carries 3 weightage.*

1. Convert 10 kWh to Joules.
2. Second Law of thermodynamics.
3. Calculate the amount of water removed, if 10 kg of food with 85% (wb) moisture content is dried to 20% (wb).
4. Air conditioning system.

Turn over

5. Types of corrosion in metals and its prevention.
6. Types of Gears.
7. Carnot refrigeration cycle.

(4 × 3 = 12 weightage)

Part C

Write essays on any **two** out of four of the following.

Each question carries 5 weightage.

1. Write about mechanical power transmission system.
2. Give the application of heat exchangers in Food Processing. Briefly explain the working principle of Tube in Tube heat exchanger.
3. Explain Carnot refrigeration cycle and bell colemen cycle.
4. What is the difference between pasteurization and freezing ? What are the advantages and limitations of freeze drying ?

(2 × 5 = 10 weightage)

**FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
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(CBCSS)

Food Science and Technology

FST 1C 03—RESEARCH METHODOLOGY AND STATISTICS

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

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Part A

*Write Short on **four** out of 7 of the following.*

Each question carries 2 weightage.

1. Ethics in research.
2. References.
3. Successive differentiation.
4. Stratified random sampling.
5. Frequency distribution.
6. *t*-test.
7. Normal distribution.

(4 × 2 = 8 weightage)

Part B

Write Short essay on **four** out of 7 of the following.

Each question carries 3 weightage.

1. Write about Intellectual Property Rights.
2. How an oral presentation to be structured for effective communication ?
3. Write about budgeting of a research proposal.
4. Write about chi-square test and its uses.
5. Differentiate simple and multiple regression.
6. What are the methods of representing data diagrammatically ?
7. Write about pilot study.

(4 × 3 = 12 weightage)

Part C

Write Essay on **two** out of 4 of the following.

Each question carries 5 weightage.

1. Solve the following :
 - (a) $d(x^2 + 3)^5 / dx$.
 - (b) $d(x^7 - x^3) / dx$.
 - (c) $d(5x^3 - 3x^2 + 5x + 4) / dx$.
2. What is the meaning of 'probability equal to 0.5' ? In a class, 40 % of the students study math and science. 60 % of the students study math. What is the probability of a student studying science given he/she is already studying math ?
3. Write in detail about sampling techniques and their importance in data collection? What is statistical quality control ?
4. The success of a shopping center can be represented as a function of the distance (in miles) from the center of the population and the number of clients (in hundreds of people) who will visit. The data is given in the table below: Calculate the linear correlation coefficient.

Number of customers (x)	8	7	6	4	2	1
Distance (y)	15	19	25	23	34	40

(2 × 5 = 10 weightage)

**FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, NOVEMBER 2020**

(CBCSS)

Food Science and Technology

FST 1C 02—FOOD CHEMISTRY AND ANALYSIS

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

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Part A

*Write short notes on any **four** out of seven of the following questions.*

1. What is caramelisation ?
2. Define flavor reversion.
3. Detectors used in Gas chromatography.
4. What are types of emulsions ?
5. Classify fatty acids with examples.
6. Explain secondary structure of protein.
7. Discuss Shortenings.

(4 × 2 = 8 weightage)

Part B

*Write short essay on any **four** out of seven of the following questions.*

1. Changes in proteins during processing.
2. Discuss sources of essential oils and their uses in foods.
3. State Beer Lamberts Law.

Turn over

4. Define Hydrolytic Rancidity.
5. Write in detail about absolute configuration in carbohydrates.
6. Describe types of structures in proteins.
7. Describe the principle of UV-Visible detector and its role in HPLC.

(4 × 3 = 12 weightage)

Part C

Write essay on any two of the following.

1. Classify plant pigments ; what are their sources ? Discuss their chemistry.
2. Moisture in foods and its determination.
3. Explain the sources of pectic substances, their properties and applications in foods.
4. Explain in detail about the quantitative determination of proteins in foods.

(2 × 5 = 10 weightage)

**FIRST SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY)
EXAMINATION, NOVEMBER 2020**

(CBCSS)

Food Science and Technology

FST 1C 01—FOOD MICROBIOLOGY

(2019 Admissions)

Time : Three Hours

Maximum : 30 Weightage

General Instructions

1. *In cases where choices are provided, students can attend **all** questions in each section.*
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Part A

*Write short on **four** out of 7 of the following questions.
Each question carries 2 weightage.*

1. Food infection.
2. Lueis Pasture.
3. Bacterial mesosome.
4. Rota virus.
5. Transduction.
6. Impedance method.
7. Synbiotics.

(4 × 2 = 8 weightage)

Part B

*Write short essay on any **four** out of 7 of the following.
Each question carries 3 weightage.*

8. Symbiotic association in yoghurt.
9. Steam Sterilization.

Turn over

10. Foodborne illness.
11. Aflatoxin.
12. Log phase in bacteria.
13. Conjugation in bacteria.
14. Electron microscopy.

(4 × 3 = 12 weightage)

Part C

*Write essay on any two of the following
Each question carries 5 weightage.*

15. Write an essay on spoilage and preservation of milk.
16. Write an assay on microbiology of sauerkraut.
17. Explain in detail various physical factors that affect bacterial growth.
18. The role of yeasts in foods.

(2 × 5 = 10 weightage)

**FIRST SEMESTER M.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION
NOVEMBER 2020**

(CUCSS)

Food Science and Technology

FT 1C 06—BASIC PRINCIPLES OF ENGINEERING

(2014 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Part A (Short Answer Questions)

*Answer any **fourteen** questions.
Each question carries 1 weightage.*

1. SI unit for Length is _____.
2. Define "Derived unit"
3. Dimensional equation for power is _____.
4. What is dew point?
5. _____ is an example for food grade Stainless Steel.
6. The concentration of hydrogen ions in the solution is used for the measurement of _____.
7. Define Velocity Ratio of gear system.
8. Water tube boiler is defined as _____.
9. In a heat exchanger driving force for heat transfer is _____.
10. Define Steam jet refrigeration.
11. Direct conversion of Ice to vapor from under vacuum is called as _____.
12. An example for Valve is _____.
13. Sensible heat is defined as _____.
14. Give one sanitary design feature of tank.
15. An example for pipe fitting is _____.
16. Enthalpy-Entropy Chart is also known as _____.
17. Under steady state condition, material entering the system is equal to material _____ system
(14 × 1 = 14 weightage)

Turn over

Part B (Short Essay)

Answer any **seven** questions.

Each question carries 2 weightage.

1. Convert 1,500 Acres to ft².
2. Define Zeroth law of thermodynamics. Write about heat pump.
3. Write about properties of air-vapor mixtures.
4. Give grades of Stainless steel used in food industry and their applications.
5. Write about the principle and types of lubrication employed in food industry.
6. What is boiler rating? Differentiate Horizontal tube and Vertical tube boilers ?
7. Why freezing helps to preserve foods for a longer period? List the stages involved in freeze drying ?
8. With an example explain the importance of material balance in food processing.
9. What is PID controller ? Give its advantages and limitations ?
10. Why humidification and dehumidification of air are needed in food processing ?

(7 × 2 = 14 weightage)

Part C (Essay)

Answer any **two** questions.

Each question carries 4 weightage.

1. A dryer is used to reduce the moisture content of 100 kg. of Potato product from 80 % to 10 % moisture. If 49,800 m³ of air at 80°C is used to dry the material and the air is cooled to 71°C in passing through the dryer, calculate the efficiency of the dryer in terms of heat supplied to heat utilized. Assume potato enters at 24°C and leaves at the same temperature as the exit air.

Specific heat of Potato- 3.35 kJ/kg °C

Specific heat of air -1.0 kJ/kg°C

Latent heat of vaporization at 71°C = 2324 kJ/kg.

Density of air – 1.06 kg./m³.

2. Explain in detail the sanitary design requirements for food processing equipments. List the types of corrosion in metals.
3. Write in detail about application of thermodynamics in food processing. Explain briefly about Mollier Chart.
4. Write in detail about refrigeration systems and list their advantages and limitations.

(2 × 4 = 8 weightage)

**FIRST SEMESTER M.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION
NOVEMBER 2020**

(CUCSS)

Food Science and Technology

FT 1C 05—APPLIED MATHEMATICS, STATISTICS AND COMPUTER APPLICATIONS

(2014 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Part A (Short Answer Questions)*Answer any fourteen questions (out of seventeen).**Each question carries 1 weightage.*

1. What is probability of type I error called ?
2. A student's average marks in statistics after 6 tests is 68%. If the score in the seventh test is 82%, what is the overall average for the student ?
3. When can Variance of a data set be zero ?
4. What is the formula for calculating the second quartile ?
5. If the Coefficient of variation is low what is its consistency ?
6. What is interval data ?
7. If two dice are thrown simultaneously and numbers appearing on their faces is multiplied together, what is the probability of that the product being equal to 4 ?
8. If $y = \sin^{-1} x$, then $y' = ?$
9. What is the maximum value of $(\sin x. \cos x)$?
10. What is the height of the tower if the angle of elevation of its top at a distance of 500 m from its base level is 30° ?
11. What is (A)' equal to ?
12. What is a spreadsheet ?
13. If $y = \cos^{-1} x$, what is its first derivative with respect to x ?

14. What is the measure asymmetry of data called ?
15. Give an example for an upper triangular matrix.
16. What is the order of the differential equation : $y'' + 2y' + (y')^2 = 0$.
17. What is $\int \sec x \tan x \, dx$?

(14 × 1 = 14 weightage)

Part B (Short Essay Questions)

Answer any seven questions (out of ten).

Each question carries 2 weightage.

18. Arithmetic mean of two numbers is 13 and their geometric mean is 13. Find the numbers.
19. Calculate the missing frequency for the following distribution, if the median is 24 :
- | | | | | | |
|----------------|------|-------|-------|-------|-------|
| Age (years) | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
| No. of persons | 5 | 25 | ? | 18 | 7 |
20. In 100 tosses of a coin, 55 heads were observed. Test the hypothesis that the coin is fair using a level of significance of 0.05.
21. Average weight of 10 energy bars is 20 g. An inspector noticed that weight are two energy bars were wrongly measured as 19.2 g and 18.6 g instead of 18.8 g and 15.8 g. Calculate the corrected average weight of the energy bars.
22. Sum of two numbers is 20. If the sum of their cubes is minimum, prove that the numbers are equal.
23. Find the area of a triangle whose vertices are (2, 8), (- 4, 2) and (5, 1) using the method of determinants.
24. Find the first derivative of $y = \sqrt{\sin \sqrt{x}}$.
25. Show that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$.
26. Distinguish between correlation and regression.
27. Write short notes on two software packages used in the food technology.

(7 × 2 = 14 weightage)

Part C (Essay Questions)

Answer any **two** questions (out of four).

Each question carries 4 weightage.

28. Show that
$$\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc + bc + ca + ab.$$

29. Theory predicts the proportion of beans in the four groups A, B, C and D should be 9 : 3 : 3 : 1. In an experiment among 1600 beans, the numbers in the four groups were 882, 313, 287 and 118. Does the experimental result support the theory?

30. Ten persons with type II diabetes were administered a new oral medication to reduce their blood sugar and their average fasting sugar before and after medication were recorded as follows :

Subject	1	2	3	4	5	6	7	8	9	10
Blood sugar (Before) :	128	145	115	156	129	147	130	127	120	145
Blood sugar (After) :	117	133	108	133	111	129	122	124	103	129

Test at 0.05 significance level whether this medication reduces blood sugar level of the type II diabetics.

31. Show that
$$\int \sqrt{a^2 - x^2} dx = \frac{x}{2} \sqrt{a^2 - x^2} + \frac{a^2}{2} \sin^{-1} \left(\frac{x}{a} \right) + c.$$

(2 × 4 = 8 weightage)

**FIRST SEMESTER M.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION
NOVEMBER 2020****(CUCSS)****Food Science and Technology****FT 1C 02—FOOD CHEMISTRY****(2014 Admissions)****Time : Three Hours****Maximum : 36 Weightage****Part A (Short Answer Questions)***Answer any **fourteen** questions.**Each question carries 1 weightage.*

1. What is pectin and give any *one* pectin rich food source.
2. Write the structures of any *two* essential amino acids.
3. Explain significance of Iodine value.
4. Describe shortening agent.
5. Define Colloid.
6. What is Atomic absorption Spectroscopy ?
7. Name two examples of MUFA and write their structures.
8. Write two uses of pectic substances in food industry.
9. Name one monosaccharide and one disaccharide and write their structures.
10. Write the formula for determination of retardation factor in Paper Chromatography.
11. Write two major food sources of Vitamin C.
12. Define emulsifying agent.
13. Explain briefly on refining of oils.
14. Name two enzymes used in starch processing.
15. What is flourimetry in brief?

16. Name two main components in column chromatography
17. _____ is an example for oil in water emulsion.

(14 × 1 = 14 weightage.)

Part B (Paragraph Questions)

Answer any seven questions out of ten questions.

Each question carries 2 weightage.

18. Write briefly about classification of carbohydrates.
19. Fats -Describe the applications in food industry along with examples.
20. Write a short note on the properties of emulsions.
21. Write a short note on GC.
22. Discuss forces involved in the protein conformation.
23. Discuss thoroughly on rancidity in fats and oils.
24. What is surface film ? Discuss role of surface films in food science.
25. Discuss the principle involved in Flame-ionisation detector.
26. Write a short note on isomerism in hexoses.
27. Describe physical and chemical properties of fats and oils.

(7 × 2 = 14 weightage)

Part C (Essay Questions)

Answer any two questions.

Each question carries 4 weightage.

28. Explain thoroughly on starch gelatinization and retro gradation.
29. Describe the types of detectors in column chromatography.
30. Discuss the changes during the processing of vitamins.
31. Describe the functions of plant pigments and changes during processing.

(2 × 4 = 8 weightage)

**FIRST SEMESTER M.Sc. DEGREE (SUPPLEMENTARY) EXAMINATION
NOVEMBER 2020**

(CUCSS)

Food Science and Technology

FT 1C 01—BASIC AND FOOD MICROBIOLOGY

(2014 Admissions)

Time : Three Hours

Maximum : 36 Weightage

Part A (Short Answer Questions)*Answer any fourteen questions.**Each question carries 1 weightage.*

- 1) In chemostat the bacterial growth is controlled by _____.
- 2) Petulin is produced by _____.
- 3) _____ phase of bacterial cells from its growth are used for metabolite production.
- 4) The very first vaccine was innovated by _____.
- 5) Bactofugation removes _____ % of bacterial cells from milk.
- 6) _____ % alcohol is more effective in killing bacteria.
- 7) _____ type of defect is very common in fruits.
- 8) _____ is the smallest pore size of filters used to retain bacteria.
- 9) _____ are the short chain peptides of bacteria having antimicrobial activity.
- 10) Radurization is also known as _____.
- 11) Aflatoxin is produced by _____.
- 12) In continuous cultures, high cell density is achieved by _____ dilution rate.
- 13) _____ enzyme is used in ATP method for estimating microbial growth.
- 14) _____ coined the word Virus.
- 15) Germ theory of diseases was proposed by _____.
- 16) _____ is the expansion of MPN.
- 17) In bacteria growth rate is reciprocal of _____.

(14 × 1 = 14 weightage)

Turn over

Part B (Paragraph Questions)

Answer any **seven** out of ten questions.

Each question carries 2 weightage.

- 18) Diauxic growth in bacteria.
- 19) 12 D concept.
- 20) Listeriosis.
- 21) Contributions of Louis Pasteur.
- 22) Explain about synchronous cultures.
- 23) How to delay the microbial spoilage of foods ?
- 24) Impedance method.
- 25) Classify bacteria present in raw milk based on their biochemical activity and temperature dependence and give one example to each group.
- 26) Indicate various methods of microbial destruction based on temperature.
- 27) Mutagenesis.

(7 × 2 = 14 weightage)

Part C (Essay Questions)

Answer any **two** out of four questions.

Each question carries 4 weightage.

- 28) A note on gene transfer methods in bacteria.
- 29) Write a note on various phases of bacterial growth curve.
- 30) Explain food poisoning and food intoxication with suitable examples.
- 31) Write about biogenesis and abiogenesis theories, indicating names of researchers supporting these theories.

(2 × 4 = 8 weightage)