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1411E1177

Candidate's Seat No : _____

M.Sc. Sem.-3 Examination

502

Food Science & Nutrition

November-2025

Time : 2-30 Hours] **[Max. Marks : 70**

Instructions: Illustrate your answers with neat diagrams wherever necessary.

Q. 1 **Write the following**

(i) Explain the t-test, ANOVA-one way and two way. (7 Marks)

(ii) The metagenome from the stool samples of mothers and babies is shown in the table to show the species abundance of different species in the samples. Draw a Venn diagram and bar graph for the representation of the following data. Draw 6 Venn diagrams and one bar graph. (7 Marks)

	Common	Mother Unique	Baby's Unique
P_Firmicutes	135	1725	404
P_Proteobacteria	142	367	1249
P_Bacteroidota	31	527	107
P_Verrucomicrobiota	04	36	88
P_Actinobacteriota	21	158	154
P_Cyanobacteria	02	22	06

OR

(i) Define the role of Biostatistics in the form of requirements, sampling techniques and population definition. (7 Marks)

(ii) Explain in brief about the standard error, standard deviation and probability theory. (7 Marks)

Q. 2 **Write the following**

(i) What is a Research problem? Draw the flow chart of the steps involved in the formulation of the research problem. (7 Marks)

(ii) What is Interpretation? Explain reasons, techniques and precautions related to Interpretation. (7 Marks)

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OR

(i) What is a Hypothesis? Explain its purpose, list out the types of hypothesis and elaborate about the Null and Alternate hypothesis. (7 Marks)

(ii) What is bioinformatics? Explain the objectives and application of bioinformatics, also list down the areas included in bioinformatics. (7 Marks)

Q. 3 **Write the following**

(i) Discuss HPTLC as an advanced version of TLC and list its major advantages. (7 Marks)

(ii) Explain gel electrophoresis with its working and applications in DNA and protein analysis. (7 Marks)

OR

(i) Explain the working of ion exchange chromatography with its application in biomolecule purification. (7 Marks)

(ii) Describe the steps involved in differential centrifugation and explain its use in cell fractionation. (7 Marks)

Q. 4 **Write the following**

(i) Discuss the principle, technique and applications of the Scanning Transmission Electron Microscope. (7 Marks)

(ii) Write a note on the resolution and magnification of the bright field microscope with its application. (7 Marks)

OR

(i) Write a note on specimen preparation for Electron microscopy and Staining (7 Marks)

(ii) Explain the principle and working of the Dark Field Microscope with its applications. (7 Marks)

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Q 5. Attempt any seven out of twelve (14 Marks)

(i) Define: Mode and Median.

(ii) What is the theory of distribution?

(iii) To find the correct outcome in the population, which of the following sampling methods is beneficial (a) Random sampling (b) Non Random sampling

(iv) Enlist the conditions of a research problem

(v) What precautions should be taken in interpretation?

(vi) What is report writing? Explain in brief the significance of Report writing.

(vii) Define relative centrifugal force (RCF).

(viii) What type of stationary phase is used in gel filtration chromatography?

(ix) State two factors that affect the migration of molecules in electrophoresis.

(x) Define the Refraction Pattern in the Magnetic Lens?

(xi) In which microscope are copper grids used for specimen mounting?

(xii) Mention the role of the Paraboloid Lens in the Dark Field Condenser.