

M.Sc. Sem.-3 Examination

503

Life Science

Time : 2-30 Hours]

November-2025

[Max. Marks : 70

Instructions:

All questions are compulsory.

Illustrate your answers with neat diagrams wherever necessary.

Question - 1 Write the following

- i) Explain the concept of population, types of sampling and sample formats. [07]
- ii) Describe the standard error, standard deviation and probability theory. [07]

OR

- i) Define the role of Biostatistics in the form of requirements, sampling techniques and population definition [07]
- ii) There was a population screening done for Cholesterol in the classroom, the range of the person is provided within the table, please use the data to calculate the outcomes. Calculate Mean, Median and Mode for the following range. [07]

Range	Number of Students
1-20	1
21-40	6
41-60	6
61-80	45
81-100	32
101-120	6
121-140	3

Question - 2 Write the following

- i) What is Hypothesis? Explain its purpose, list out types of hypothesis and elaborate about Null and Alternate hypothesis [07]
- ii) Draw the flow chart of the steps involved in the formulation of research problem till preparation of report [07]

OR

- i) What is Research Design? Why is there a need for Research Design? List out Features of a good research Design? [07]
- ii) What is virtual screening of drug molecule? Explain ligand based and Structure based virtual screening in detail. [07]

Question - 3 Write the following

- i) Explain the principle of Microscope and describe the instrumentation of Bright Field Microscope [07]
- ii) Describe the principle and instrumentation of Differential Interference Contrast Microscope. Add its applications [07]

OR

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- i) Describe the principle and technique of Transmission Electron Microscope. [07]
Add its applications
- ii) Explain the patterns of Illumination in Microscope. Add the description of any one of them. [07]

Question - 4

Write the following

- i) What is Screening? Explain Primary screening of antibiotic producing bacteria. [07]
- ii) What do you mean by inoculum media and fermented media? Discuss various nitrogen sources used for preparing industrial fermentation media. [07]

OR

- i) Discuss Microbial biomass and Primary metabolites as fermentation products. [07]
- ii) Draw and give brief about the Ideal/typical fermenter and write the functions of fermenter [07]

Question - 5

Attempt any seven out of twelve

[14]

- i) If the standard deviation is 5% of the total value at the base value of 100, what is the range it represents?
 - a. 0-5 & 5-10
 - b. 95-100 & 100-105
 - c. 50-55 & 55-60
 - d. None of the above
- ii) Shadow casting is a sample preparation technique for which type of microscopy?
- iii) What are Secondary metabolites? Give two examples
- iv) Give two example of nitrogen sources used in industrial fermentation medium
- v) Mention the Role of Phase Plate in Phase Contrast Microscope.
- vi) How we avoid the contamination in sterile fermentation
- vii) If the Gene expression has probability of 50% active transcription under the DNA methylation status of the promoter, what is the probability for the transcription to be inactive in case the promoter is not methylated?
 - a. 100%
 - b. 0%
 - c. 50%
 - d. 25%
- viii) Explain: Critical Illumination
- ix) Write the definition of Applied and Quantitative Research
- x) List down types of graphs and explain line graph in brief
- xi) Entrepreneurship comes with many responsibilities in the field of Biotechnology, if you have to launch the product which supports increased recovery upon consumption, if you go to a place to give a lecture about the product would that be considered as advertisement or marketing?
- xii) Write application of nucleotide databases

