

Instructions:

All questions are compulsory.

Illustrate your answers with neat diagrams wherever necessary

1. Answer **Any two:** [14]
- (A) Explain mean deviation and standard deviation with examples.
- (B) From the following data, use chi-square test and conclude whether inoculation is effective in preventing tuberculosis:
- | | Attacked | Not attacked |
|----------------|----------|--------------|
| Inoculated | 135 | 300 |
| Not inoculated | 181 | 70 |
- Given that $\chi^2 = 3.84$ at 5% level of significance for 1 degree of freedom.
- (C) Explain the probability and Level of Significance with suitable example for data validation.
- (D) Discuss various IT tools in determination in protein configuration and experimental design.
2. Answer **Any two:** [14]
- (A) Discuss the Principle and working of Dark field Microscope. Add its applications.
- (B) Discuss the types of Objectives and Eye piece in Light Microscope. Add its advantages.
- (C) Discuss the Incident Mode of Illumination with special emphasis of Epi-fluorescence Microscope.
- (D) Discuss the Principle and working of Phase Contrast Microscope. Add its advantages.
3. Answer **Any two:** [14]
- (A) Discuss Electron Matter Interaction. Draw the Ray path in Transmission Electron Microscope.
- (B) Give an account on Specimen preparation for Electron Microscopic observations.
- (C) Discuss the Principle and construction of Transmission Electron Microscope based on Scanning Beam mode.
- (D) Define Cytometer. Discuss the principle and techniques of Flow Cytometer. Add its applications chromosome sorting.
4. (A) Compare the Liquid Phase Radio-Binding Assay and Solid Phase ELISA for the Measurement of Hormone. [7]
- OR
- (A) Discuss the Principle and method of Autoradiography. Add its applications.
- (B) Discuss Various Radioactive isotopes and their importance in Biological Sciences [7]
- OR
- (B) Discuss the Principle, and Techniques of Competitive Radioimmunoassay. Add its applications.
5. Answer **very briefly** only [14]
- (A) Define null and alternative hypothesis.
- (B) Define mode.
- (C) Define NA and its relation to determine resolution in Microscope.
- (D) Explain Kohler Illumination.
- (E) Describe Wollaston Prism and its importance.
- (F) Mention the important contribution of Robert Hook and Antonie van Leeuwenhoek
- (G) Discuss the Radio-sensitivity of cells and molecules.

Time : 3 Hours]

Q.1 (A) Discuss primary and secondary metabolites as fermentation products. (17)

(A) What is OR Secondary Screening ? Explain significance of secondary screening.

(B) Explain design of industrial fermenter. (17)

(B) Discuss various OR natural sources of carbon used for preparation of industrial fermentation media.

Q.2 Answer any two :- (14)

(A) With flow-sheet diagram, explain fermentative production of citric acid.

(B) Discuss recovery process of any industrial enzyme.

(C) Discuss laboratory equipments used for animal cell culture.

(D) Discuss culture media.

Q.3 Answer any two :- (14)

(A) Discuss characteristics of Cloning vectors.

(B) Discuss various enzymes involved in replication of DNA.

(C) Write a note on DNA fingerprinting.

(D) Explain molecular organization of chromosome.

Q.4 Answer any two :- (14)

(A) Biogas production.

(B) Biofertilizers and their importance.

(C) Single cell protein.

(D) Vitamin B12.

Q.5 Answer very briefly :-

- (i) Give two examples of biotransformation products.
- (ii) Define Inoculum.
- (iii) Mention types of Spargers.
- (iv) Give two examples of antifoam agents.
- (v) Mention uses of Ethanol.
- (vi) What is MEOR ?
- (vii) What is FISH ? Explain its importance.

— X —