



Seat No. : _____

NI-143

November-2025

M.Sc., Sem.-III

BOT-504 : Botany

(Biophysics, Biostatistics and Bioinformatics)

Time : 2:30 Hours]

[Max. Marks : 70

- Instructions :** (1) All Questions carry equal marks.
(2) Attempt all Questions.

1. Explain the principle and working of Nuclear Magnetic Resonance (NMR) spectroscopy. **14**

OR

1. (A) Write a short note on Tracer Techniques in Biology and their applications. **7**
1. (B) Describe the effects of Ionizing and non-ionizing radiation on living systems. **7**
2. Explain about : mean, median, mode and standard deviation. **14**

OR

2. (A) Explain about Data collection. **7**
2. (B) Write a note on Linear correlation. **7**
3. Define a Biological Database. Explain with examples how primary, secondary and specialized databases act as the foundational pillars of modern bioinformatics. **14**

OR

3. (A) Explain the structure, function and importance of the Protein Data Bank (PDB) and NCBI in bioinformatics research. **7**
3. (B) Discuss the structure, organization and applications of UniProt database. **7**

4. Define CADD. Explain the fundamental difference between its two primary strategies : SBDD and LBDD. 14

OR

4. (A) Describe the types of sequence alignment. 7
4. (B) Define homology modelling and outline the key steps involved in generating a 3D protein model from its amino acid sequence. 7

5. Attempt any 7 out of 12 MCQs/Short question (One- or Two-line answer)/ Fill in the blanks/True or False etc. 14

- (1) Define half-life of a radioactive isotope.
 - (2) Write the formula for calculating energy of a photon and name the parameters involved.
 - (3) Name any two biological processes where the first law of thermodynamics is applicable.
 - (4) Explain SPSS.
 - (5) What is the probability of getting a sum 9 from two throws of a dice ?
 - (6) Define Chi square with its formula.
 - (7) List two essential functions of a biological database.
 - (8) What type of data is submitted to a primary database ?
 - (9) What is the key difference between RAM and ROM ?
 - (10) What is molecular docking ?
 - (11) What are ADMET properties ? Why are they important in the drug discovery process, and how does CADD help predict them ?
 - (12) Define Sanger Sequencing.
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