

**THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA**  
**(Department of Biotechnology & Environmental Sciences)**  
**M.Sc I year Biotechnology (End semester Examination)**  
**BH004: Biostatistics & Bioinformatics**

**Time: 3 hours**

**Max. Marks: 36**

**Answer any six questions**

1. What are the basic principles to be observed in experimental design? Explain briefly the various types of experimental designs. **(6.0)**
2. By using UPGMA, reconstruct a phylogenetic tree using the following distance matrix. **(6.0)**

Species	A	B	C	D
B	3	-	-	-
C	6	5	-	-
D	9	9	10	-
E	12	11	13	9

3. What is Needleman and Wunsch algorithm? By using maximum-match pathway draw a complete matrix for the sequences YFLQLKFDPELLFGVQ and YHFKLKFDPELLFNQQ. **(6.0)**
4. Write short notes of the following : **(2 x 3= 6.0)**
  - a) BLOSUM and PAM
  - b) Dot Plot
  - c) Maximum Parsimony
5. Write short notes of the following: **(2 x 3= 6.0)**
  - a) PSI- BLAST
  - b) Hidden Markov Model
  - c) BLOCKS
6. Describe multiple sequence alignment giving emphasis on ClustalW and MultAlin. **(6.0)**
7. An experiment was carried out to test the effect of 4 different training methods on increasing mental ability of children. Each training method was given to one group of 5 children. The four groups of children were matched for age and sex. Test whether the four methods of training differ significantly with each other using ANOVA. **(6.0)**

**Continue in page 2**

Mental ability by methods of training			
A	B	C	D
15	12	10	14
20	17	15	20
16	11	12	16
19	18	14	18
19	16	14	13

8. Write short notes of the following:

(1.5 x 4= 6.0)

- a) Correlation
- b) Standard Deviation
- c) Probability laws
- d) Dunnett's test

\*\*\*\*\*