2024

M.Sc. 2nd Semester Examination

MICROBIOLOGY

PAPER : MCB-203

[Biomathematics and Bioinformatics]

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Answer from both the Units.

UNIT—A (203.1)

GROUP—A

Answer *any* **two** of the following questions :

2×2=4

1. What is variable? Give example.

2. Write the use of t-test?

(Turn Over)

3. What is correlation?

4. Why sampling is needed for any statistical analysis?

GROUP—B

Answer *any* **two** of the following questions :

$4 \times 2 = 8$

5. What is chi-square test? State the null hypothesis and alternative hypothesis of chi-square test of goodness of fit. 1+3

6. State the use of frequency polygon and histogram. What is pie diagram? 3+1

7. What is standard error? Determine the standard deviation of the following body height (cm) of human : 1+3

180, 165, 170, 162, 176, 167, 180, 162, 165, 165, 170, 170.

8. Determine the median of the following body weight (g) of experimental mice : 3+1

19, 21, 22, 26, 28, 30, 31, 35, 35, 37.

What is mode?

(d) Write down the difference between global and local sequence alignment. 4

GROUP—C

3. Answer *any* **one** of the following questions :

$8 \times 1 = 8$

(a) Write the steps involved in BLAST alignment. What is cladogram? Define Root and Node. 4+2+2

(b) What is mutation matrix? Name two tools used for molecular docking. Briefly describe the steps of protein modelling and ligand binding. 1+2+5

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GROUP—C

Answer *any* **one** of the following questions :

8×1=8

9. What are one tail and two tail t-tests? Body weight (gram) of 8 male albino and 8 female albino mice are given below. Determine whether or not the mean weight of males is significantly higher than the females.

(Critical t-score : $t_{0.01(14)}$ = 2·624)

Male	51	60	57	55	62	58	63	61
Female	48	52	51	56	53	52	55	49

2+6

10. Write short notes on (*any* **four**) :   2×4=8

(i)   Qualitative data and quantitative data

(ii)   Determination of D-Value

(iii)   Degree of freedom in statistical test

(iv)   Random Sampling

(v)   Skewness and kurtosis

(vi)   Variance

GROUP—A

1. Answer *any* **two** of the following questions :

2×2=4

(a)   Define pharmacogenomics. Mention the benefits of pharmacogenomics.   1+1

(b)   What is k-tuples of k-tups?   2

(c)   What is out-group in phylogenetic tree?   2

(d)   Name the scientist who created the first bioinformatics database. Who coined the term 'Bioinformatics'?   1+1

GROUP—B

2. Answer *any* **two** of the following questions :

4×2=8

(a)   Define Genetic Algorithm. Write down the features of algorithm.   2+2

(b)   Write a short note in dot matrix method. 4

(c)   What is the basis of Sequence Alignment? How you can identify a FASTA sequence format?   2+2