2022

MICROBIOLOGY

[P.G.]

(M.Sc. Second Semester End Examination-2022)

PAPER- MCB-203

[Biomathematics and Bioinformatics]

Full Marks: 40   *Time: 02 Hrs*

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

Group – A (Biomathematics)

Marks 20

1. **Answer any two questions from the following:**   2x2= 4

    a. What is statistics? Write its application.   1 + 1

    b. What are meant by sample and population?   1 + 1

    c. Define median. Write the relation between mean, median and mode.

    1 + 1

    d. What is generation time of bacteria? Define specific growth rate.   1 + 1

2. **Answer any two questions from the following:**   2x4 = 8

    a. What is the relation between standard deviation and coefficient of variation? Write about pie diagram.   2 + 2

b. Write a note on models of regression. Write down the linear regression equation of y on x. 3+1

c. Albino rats were administered with an ayurvedic medicine at the rate of 10mg/kg per day for 7 days. Initial and final body weights of the rats were recorded as shown in table. Determine whether the drug has any significant effect on the gain or loss of body weight of rat.

Rat no.	1	2	3	4	5	6	7	8	9	10
Initial body weight	110	115	102	98	112	110	97	120	102	110
Final body weight	109	116	100	95	108	112	98	115	98	111

Critical t values : $t_{.05(9)}$ 2.262; $t_{.01(9)}$ 3.250; $t_{.001(9)}$ 4.781

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d. What is sigmoidal growth curve? Write down the relation between growth rate and concentration of the rate limiting substrate. 2+2

3. **Answer any one question of the following:** 1×8 = 8

a. Represent the mathametical modelling for the microbial growth kinetics and specific bacterial growth rate. What is bivariate data?

b) Derive the equation of correlation coefficient. Write down the significance of correlation coefficient.

Work out a linear regression equation of typewriting score on vocabulary test score using the following data.

Individual	1	2	3	4	5	6	7	8	9
Vocabular (X)	8	22	35	19	23	13	2	14	11
Typewriting (Y)	29	48	55	45	50	35	18	38	30

Group – B (Bioinformatics)

Marks 20

4. **Answer any two questions from the following:** 2×2= 4

a. What is bioinformatics? Write down its applications 1+1

b. Define gene Annotation. 2

c. Write down the full form of BLAST and FASTA. 1+1

d. what is Gap penalty? 2

5. **Answer any two questions from the following:** 2×4 = 8

a. Differentiate between Primary and secondary database with example for each. 4

b. Mention the important differences between global and local Alignment. 2+2

c. What are the tools used for elucidation of protein structures? How is the coordinate information preserved once the protein structure has been determined? 2+2

d. What is BLAST? What are types of BLAST? 2+2