PG/IIS/MCB/209/25
(Pr.)

M.Sc. 2nd Semester Examination, 2025

MICROBIOLOGY

(*Biomathematics and Bioinformatics*)

(Practical)

PAPER – MCB-209

Full Marks : 25

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

1. Using the supplied protein sequence (FASTA format), construct a rooted phylogenetic tree using an appropriate method with 100 bootstrap replicates by considering five homologs. Identify the bacterial species and label all species in the tree, display bootstrap values and interpret the evolutionary relationships. Save your analysis session, export the phylo-

genetic tree in both Newick format (.nwk) and image format (.png) and specify the names of the tools used throughout the process.

[Work–4, Result–6 = 10]

2. A microbiologist is testing the effectiveness of three different disinfectants (A, B and C) on bacterial growth on hospital surface. The surfaces are swabbed after treatment and bacterial colony counts (in CFU/cm^2) are measured after 24 hours. The following sets of results are obtained :

SET A		
Disinfectant A	**Disinfectant B**	**Disinfectant C**
45	30	10
50	28	12
43	32	8
47	29	11

(*Continued*)

SET B		
Disinfectant A	**Disinfectant B**	**Disinfectant C**
120	60	30
130	55	35
125	58	28
118	62	32

SET C		
Disinfectant X	**Disinfectant Y**	**Disinfectant Z**
150	90	40
145	85	35
155	88	38
142	98	36

(*a*) Conduct a one-way ANOVA (at a 0.05 significance level) to determine whether there is a significant difference in bacterial count between the three disinfectants. 3

(*b*) What are the null and alternative hypotheses for this ANOVA test ? 2

3. Laboratory notebook 2

4. Viva-voce 3

5. Internal Assessment. 5
