

M.Sc. MICROBIOLOGY
FOURTH SEMESTER
RESEARCH METHODOLOGY, BIOINFORMATICS & BIostatISTICS
MMB – 401

(Use Separate Answer Scripts for Objective & Descriptive)

Duration: 3 hrs.

Full Marks: 70

(PART-A: Objective)

Time: 20 min.

Marks: 20

Choose the correct answer from the following:

1X20=20

- Which is a secondary literature database?
 - Flybase archive
 - Biocatalogue
 - Both
 - none
- What is the similarity score for the sequence GGAATCCCC
GAAATC-CCC
 - 3
 - 3
 - 7
 - 0
- Which is a secondary protein database?
 - I proclass
 - NRDB
 - OWL
 - All
- Which of the following best describes init 1 in FASTA?
 - Highest scoring diagonal using PAM
 - Highest scoring diagonal using gaps
 - Creating k tuple
 - All
- When you align a protein sequence against translated nucleic acid sequence, it is known as
 - tblastn
 - tblastx
 - Phi blast
 - Psi blast
- Which type of alignment is seen in multiple sequence alignment?
 - Local alignment
 - Global alignment
 - Both
 - None
- Which MSA tool is for aligning less no of sequences?
 - pileup
 - PIMA
 - Clustal w
 - All
- Research is basically
 - A methodology of enquiry
 - Search of truth
 - A systematic exploration of facts
 - All of the above
- A research is based on
 - Ideas of the scientists
 - Experiments
 - Scientific methods
 - Some general principles

10. A researcher problem is feasible only when:
- It has utility and relevance
 - It is researchable
 - It is new and adds something to knowledge
 - All of the above
11. The ethics in research is not related to:
- Self interest
 - Scientific method
 - Reliability
 - Humanity
12. Books and records are the _____ sources of data
- Primary
 - Secondary
 - Tertiary
 - None of these
13. Data collection from published books are
- Primary data
 - Secondary data
 - Tertiary data
 - None of these
14. If the CV of a certain distribution is 15%, standard deviation is 3, then what is the value of the mean?
- 50
 - 30
 - 20
 - 40
15. If a random variable X follows a Poisson distribution with parameter 4, then the standard deviation of X is _____
- 5
 - 16
 - 4
 - 2
16. Let a normal variate X has mean 12 and variance 9, then the value of the standard normal variate Z for the value $X = 15$, is
- 0.33
 - 0.33
 - 1
 - 1
17. Which of the following test is used in Analysis of Variance?
- The equality of several population variances
 - The equality of several population means
 - Both a and b
 - Neither a nor b
18. The measures _____ can be determined graphically.
- mean and median
 - mean and mode
 - median and mode
 - none
19. Which of the following design-The number of replications is equal to the number of Treatments?
- Completely Randomized Design
 - Randomized Block Design
 - Latin Square Design
 - None
20. Repetition of treatment in an experiment is the principle of
- Randomization
 - Replication
 - Local Control
 - None

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(PART-B : Descriptive)

Time : 2 hrs. 40 min.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. What are the different methods to identify an unknown sequence? 2+4+2+
2=10
Explain any one method and state the important parameters of the method to validate the results. What is E value?

2. Which is the most advantageous tree building method and why, explain the method? Create alignment using PAM matrix for the following sequences 5+5=10
AVLKY
AIMKR

3. Let the rate of dying people due to cancer is 2%. In a sample of 200 people, what is the probability that 5+5=10
 - i. Not more than 4 people will die due to cancer?
 - ii. Less than 5 people will die due to cancer?[Given, $e^{-4} = 0.0183$]

4. Following data give the yield on 12 plots of land in four samples of three plots each under four varieties of fertilizers A, B, C and D 10

A	B	C	D
25	20	25	21
24	18	26	20
23	19	29	22

Test whether there is any significant difference in the average yields of land under four varieties of fertilizers. [given, the critical value $F_{0.05}(3,8)=4.07$ and $F_{0.05}(8,3)=8.85$]

5. A certain vaccine was administered to 500 patients out of a total of 700 in a certain locality to test its efficiency against COVID-19. The incidence of COVID-19 is shown below. Find out the effectiveness of the vaccine against the disease. (The table value of χ^2 for 1 degree of freedom at 5% level of significance is 3.84). 10

	Infection	No. infection
Administering the vaccine	: 170	330
Without administering	: 155	45

the vaccine

6. What is research design? What is its need? Write the characteristics of a good research design 4+3+3
=10
7. What is data collection in research methodology? Define primary data and secondary data. Explain the methods of collecting primary data. 2+4+4
=10
8. What is the meaning of Research? What are the objectives of Research? Also give the significance of Research. 3+4+3
=10

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