

**B.Sc. MICROBIOLOGY
FIFTH SEMESTER
BIOINFORMATICS AND BIOSTATISTICS
BMB-503**

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs.

Time: 30 mins.

(Objective)

Choose the correct answer from the following:

- Automated DNA sequencing was invented by:
 - Marvin Carruthers
 - Leory Hood
 - Both a and b
 - Neither a nor b
- Following is not an example of secondary nucleotide database:
 - RefSeq
 - PIR
 - OMIM
 - dbEST
- Restriction enzyme site for EcoRI is:
 - 5'-GAATTC-3'
 - 5'-ATTACT-3'
 - 5'-GATA-3'
 - None of the above
- GenBank database is divided into:
 - 20 divisions
 - 15 divisions
 - 10 divisions
 - 18 divisions
- BLOSUM 82 means:
 - Sequences are distantly related
 - Sequences are closely related
 - Homologous sequences
 - None of the above
- Following is an example of Global Alignment web based program.
 - SIM
 - LALIGN
 - GAP
 - SSEARCH
- The suitable substitution matrix to align closely related sequences is:
 - PAM 250 or BLOSUM 80
 - PAM 40 or BLOSUM 80
 - PAM 120 or BLOSUM 40
 - PAM 250 or BLOSUM 40
- In isoelectric point, the net charge on the amino acid is:
 - 1
 - 1
 - 0
 - None of these
- The genome size of E. coli is:
 - 10Mb
 - 12Mb
 - 15Mb
 - 5Mb
- In Ramachandran plot, the phi, psi angles are also called:
 - Dihydral angles
 - Torsional angles
 - Both a and b
 - None of these

**SET
A**

Full Marks: 70

Marks: 20

1×20=20

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11. Following is an example of file format conversion software:
- a. TarFishDock
 - b. FlexX
 - c. OpenBabel
 - d. AutoDock
12. β -meander is an example of:
- a. Super-secondary structure
 - b. Tertiary structure
 - c. β -pleated sheet
 - d. Primary structure
13. The events A = The person X is death at a certain time and B = The person X is alive at the same time, are:
- a. Exhaustive
 - b. Mutually exclusive
 - c. Independent
 - d. Dependent
14. Which of the following measures is affected by the extreme values?
- a. Median
 - b. Mode
 - c. Mean
 - d. None of the above
15. In a Binomial distribution with parameters $n = 10$ and $p = 0.6$ then the variance is:
- a. 6
 - b. 2.4
 - c. 4
 - d. None of the above
16. The number of people died due to viral fever in a certain month, is an example of:
- a. Binomial distribution
 - b. Poisson distribution
 - c. Normal distribution
 - d. None of the above
17. Degree of freedom is associated with:
- a. t test
 - b. Chi-square test
 - c. F test
 - d. All of the above
18. If the calculated value of the test statistic is less than its critical value, then:
- a. The null hypothesis is not rejected
 - b. The null hypothesis is rejected
 - c. No conclusion
 - d. None of the above
19. If $r_{xy} = \bar{r}$, then X and Y are:
- a. Dependent
 - b. Independent
 - c. Not related
 - d. None of the above
20. To predict Y, when X is given, which of the following regression line is used?
- a. X on Y
 - b. Y on X
 - c. Either a or b
 - d. None of the above

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(Descriptive)

Time : 2 hr. 30 mins.

Marks : 50

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

1. Write short notes on: 5+5=10
a) Mass spectrometry
b) NCBI
2. Generate phylogenetic tree from the given UPGMA matrix. 10
- | | | | | | |
|---|---|---|---|---|---|
| | A | B | C | D | E |
| A | 0 | | | | |
| B | 2 | 0 | | | |
| C | 4 | 4 | 0 | | |
| D | 6 | 6 | 6 | 0 | |
| E | 6 | 6 | 6 | 4 | 0 |
| F | 8 | 8 | 8 | 8 | 8 |
3. Explain the hierarchy of protein structures through primary, secondary and tertiary structures. 10
4. Write down the general features of eukaryotic and prokaryotic genome. 10
5. a) Write the steps of testing of hypothesis. 5
b) A pharmaceutical company maintains that the mean time for a drug to take effect is 24 minutes. In a sample of 20 trials, the mean time is found to be 26 minutes with a standard deviation of 4 minutes. Can you say that the claim of the company is justified at 5% level of significance? [Given, the critical value of the test statistic at 5% significance level and 19 df is 2.09] 5
6. Find mean, median, mode, standard deviation and coefficient of variation for the following distribution: 10
- | | | | | | |
|------------|-----------|---------|---------|---------|---------|
| Class | : 10 - 15 | 15 - 20 | 20 - 25 | 25 - 30 | 30 - 35 |
| Frequency: | 5 | 8 | 12 | 16 | 18 |
7. Explain with examples the positive, negative and zero correlations. 10
8. a) Write the properties of Binomial distribution. 4
b) If the rate of recovery of patients in a hospital from a certain disease is 2%, in a sample of 100 patients in the hospital, what is the probability that (i) Exactly three people recover? (ii) At least 2 people recover? [Given, $e^{-2} = 0.1353$] 6

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