

B.Sc. MICROBIOLOGY
SIXTH SEMESTER
ADVANCES IN MICROBIOLOGY
BMB-603
[USE OMR SHEET FOR OBJECTIVE PART]

SET
B

Duration: 3 hrs.

Full Marks: 70

(Objective)

Time: 30 mins.

Marks: 20

Choose the correct answer from the following:

1 × 20 = 20

- Endotoxin (LPS) is an important constituent of:
 - Gram positive bacteria
 - Gram negative bacteria
 - Protozoa
 - Fungi
- The bacteria that contains two circular chromosome is:
 - Escherichia coli*
 - Staphylococcus aureus*
 - Vibrio cholerae*
 - Pseudomonas aeruginosa*
- Which of the following is used for Ca²⁺ ion detection?
 - Effector proteins
 - CDPKs
 - R gene
 - Guard cells
- C-value paradox refers to the:
 - Lack of correlation between genome size and genetic complexity
 - Lack of correlation between genome size and overall size of the genome
 - Presence of correlation between genome size and genetic complexity
 - Lack of correlation between genome size and total RNA contents
- Lac operon was discovered by:
 - Alec Jeffreys
 - Hershey and Chase
 - Meselson and Stahl
 - Jacob and Monod
- Proteomics refers to the study of.....
 - The entire set of expressed proteins in the cell
 - Biomolecules
 - Set of proteins in a specific region of the cell
 - Set of proteins
- Biofilms can be found benefiting our bodies.....
 - In the mouth
 - In replacement joints
 - On contact lenses
 - In the gut system
- Quorum sensing is used by bacterial cells to determine which of the following?
 - The size of the population
 - Favorable conditions
 - The availability of nutrients
 - All of them
- Which of the following is an example of Homology and similarity tool used in metagenomics?
 - BLAST
 - RasMol
 - PROSPECT
 - EMBOSS

10. Which of the following type of vaccines authorized by the FDA and WHO are proven to be effective and safe against the COVID-19?
 - a. Live attenuated
 - b. Toxoid vaccine
 - c. mRNA vaccine
 - d. Conjugated vaccine
11. Maturation I phase of biofilm formation occurs when there are:
 - a. Microcolonies
 - b. 3-D mushroom like structures
 - c. Van der Waals forces
 - d. All of the above
12. Virulence is measured at the host level by determining the:
 - a. IC_{50}
 - b. LD_{50}
 - c. IC_{100}
 - d. LD_{100}
13. Activation of R gene involves:
 - a. Ion flux
 - b. ROS generation
 - c. Deposition of lignin and callose
 - d. All of the above
14. What are "pathogenicity islands"?
 - a. Clusters of virulence factor genes that can be transmitted by horizontal gene transfer
 - b. Groups of pathogenic bacteria bound to M cells
 - c. Patches of membrane receptors to which pathogenic bacteria bind
 - d. Plasmids on which multiple antibiotic resistance genes are located
15. Which of the following is a positive regulator of Lac Operon?
 - a. CAP-cAMP
 - b. Repressor
 - c. Glucose
 - d. Lactose
16. All of the following techniques involve hybridization between single-stranded nucleic acid molecules *except*:
 - a. Southern blotting
 - b. Northern blotting
 - c. RFLP
 - d. DNA microarray
17. Which is a reason for antimicrobial resistance being higher in a biofilm than in free-floating bacterial cells?
 - a. The EPS allows faster diffusion of chemicals in the biofilm
 - b. Cells are more metabolically active at the base of a biofilm
 - c. Cells are metabolically inactive at the base of a biofilm
 - d. The structure of a biofilm favors the survival of antibiotic resistant cells
18. What is the chemical nature of endotoxins?
 - a. Lipopolysaccharideheteropolymer
 - b. Polysaccharide
 - c. Protein
 - d. Lipoprotein
19. What is metagenomics?
 - a. Genomics as applied to a species that most typifies the average phenotype of its genus
 - b. The sequence of one or two representative genes from several species
 - c. Sequencing DNA from a group of species from the same ecosystem
 - d. The sequencing of only the most highly conserved genes in a lineage
20. Subunit vaccine is all, Except:
 - a. A whole purified virus
 - b. A purified part or pieces of the antigen
 - c. An expensive type of vaccine
 - d. A Hepatitis-B vaccine

(Descriptive)

Time : 2 hr. 30 mins.

Marks : 50

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

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| 1. Describe Lac Operon in detail. | 10 |
| 2. Explain the mechanism of hypersensitive response to plant pathogen. Explain systemic immune response in plants. | 5+5=10 |
| 3. What is pangenome? Explain with a labelled diagram. Explain core genome pool. | 5+5=10 |
| 4. Explain the mechanism of horizontal gene transfer. | 10 |
| 5. What is metagenomics? How does it help in understanding bacterial diversity? Briefly write about the gene prospecting by using metagenomics. | 1+4+5=10 |
| 6. Write a thorough note on quorum sensing of bacteria. | 10 |
| 7. What is a virulence factor? Write a detailed account on microbial virulence factors. | 2+8=10 |
| 8. Explain biofilm formation with diagram and highlight its significances. | 2+8=10 |

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