

**CENTRAL UNIVERSITY OF HARYANA**

End Semester Examinations March 2023

**Programme: M.Sc. (Microbiology)**

**Semester: First**

**Course Title: Virology**

**Course Code: SIAS MB 1 1 05 C 3003**

**Session: 2022-23**

**Max. Time: 3Hr**

**Max. Marks: 70**

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**Instructions:**

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student needs to answer any two parts of each question. Each part carries seven marks.

Q1. (4X3.5=14)

- |                         |                               |
|-------------------------|-------------------------------|
| a) Discovery of viruses | e) Early and late proteins.   |
| b) Phage Therapy        | f) Interferon's               |
| c) PFU                  | g) Oncogenic viruses          |
| d) Cryptograms          | h) Lytic and lysogenic cycles |

Q2. (2X7=14)

- a) Discuss the methods of detection and enumeration of viral purification in the sample?
- b) Describe the major role of technology in the early development of virology?
- c) Why are some enveloped viruses' pleomorphic? Explain mechanism of internalization viruses into host cells?

Q3. (2X7=14)

- a) Briefly highlight the significant developments in the animal virology.
- b) Indent the various characteristics used in the classification of viruses.
- c) Give detail account for Baltimore classification - assembly, maturation and release of virions?

Q4. (2X7=14)

- a) What are the modes of transmission of viruses in plants? Explain?
- b) Describe history of virology in details and the significant contribution of any two scientists in the development of virology?
- c) How is transcription regulated in lambda phage?

Q5.

(2X7=14)

- a) Explain how the viral nuclear system used for gene therapy?
- b) What are the diseases caused by viruses in animals?
- c) Discuss any three antiviral drug's mode of action & mechanism.

# CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations March 2023

**Programme:** Ph.D. Microbiology

**Session:** 2022-23

**Semester:** First

**Max. Time:** 3 Hours

**Course Title:** Microbial Metabolism

**Max. Marks:** 70

**Course Code:** SIAS MB 02 01 02 GEC

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## **Instructions:**

1. Question no. 1 has eight parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Q 1. Comment on any four of the following:

- a. Uniport versus Cotransport with explanation of Symport and Antiport
- b. Nutrient active transport in microbes
- c. Entner-Doudoroff pathway
- d. Glyoxylate cycle
- e. Polyamine biosynthesis
- f. Transamination reaction
- g. Secondary metabolites
- h. Antibiotics production

(4X3.5=14)

Q 2.

- a. Outline the classification of microbes with definition and examples based on energy source, carbon source and source of reducing power. Differentiate between aerobic, anaerobic and fermentative metabolism. (3+4)
- b. What is generation time 'g' and growth rate 'R' for bacterial growth. Derive the mathematical relationship between generation time (g) initial population ( $N_0$ ) and population at time t ( $N_t$ ) based on number of generation (n) and growth rate (R). (2+5)
- c. Differentiate between continuous, batch and synchronous culture. What is a chemostat and turbidostat. (4+3)

Q3.

- a. Give a flow chart of pentose phosphate pathway along with the enzymes involved in each step. (7)
- b. Describe the fundamental reactions catalyzed by the following group of enzymes: Aconitase, Carboxylase, Dehydrogenase, Enolase, Epimerase, Isomerase, Kinase, Ligase, Lyase, Phosphatase. What are the advantages of operating Pentose Phosphate pathway in parallel to operative Glycolytic pathway? (5+2)
- c. Schematically show glycolytic pathway. Describe the fundamental reactions catalyzed by the following group of enzymes: Phosphorylase, Mutase, Synthase, Synthetase (5+2)

Q4.

- a. How nitrogen and nitrate gets assimilated? Describe stickland reaction. (5+2)
- b. What is nitrogen assimilation. Describe GS-GOGAT pathway with reactions. (1+6)
- c. Describe the biosynthetic pathway for Aspartate, Alanine, Serine. (7)

Q5.

- a. Describe different aspects of strain development. (7)
- b. Describe aspects of fermentation of citric acid and lactic acid. (7)
- c. Differentiate between primary and secondary metabolite. Classify secondary metabolites. (2+5)

# CENTRAL UNIVERSITY OF HARYANA

Term End Examinations, March 2023

**Programme** : M.Sc. Microbiology  
**Semester** : First  
**Course Title** : Principles of Biochemistry  
**Course Code** : SIAS MB 1 1 02 C3003

**Session: 2022-23**  
**Max. Time: 3 Hours**  
**Max. Marks: 70**

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## Instructions:

1. There are total five questions in this paper. All questions are compulsory and carry 14 Marks each.
2. Question no. 1 has seven sub parts and students are required to answer any four. Each part carries three and half Marks.
3. Question no. 2 to 5 have three sub parts and students are required to answer any two parts of each question. Each part carries seven marks.

## Question No1.

(4X3.5=14)

- a) Explain anomers and epimers using suitable examples.
- b) Write down the reaction that links end product of glycolysis with TCA Cycle.
- c) What are the components of fatty acid synthase complex?
- d) What is the structural representation of alanine at pH-3, 7 &12
- e) Write down the significance of  $K_m$ , and  $K_{cat}$
- f) Draw the labelled structure of t-RNA, highlighting significance of each arm.
- g) What are the disorders of purine metabolism.

## Question No2.

(2X7=14)

- a. What is gluconeogenesis? How does reversal of glycolytic sequence take place?
- b. How are polysaccharides classified? Write a note on structural and storage polysaccharides.
- c. Describe various steps of TCA cycle. Why is the TCA cycle the central pathway of metabolism of the cell?

**Question No3.**

**(2X7=14)**

- a. Describe the structure and function of sphingolipids and glycerophospholipids.
- b. Explain the process of  $\beta$ -oxidation of fatty acid.
- c. Describe the fatty acid biosynthesis degradation.

**Question No4.**

**(2X7=14)**

- a. What is transamination and oxidative deamination reaction in amino acid metabolism?
- b. State the importance of urea cycle of amino acid.
- c. How can you determine  $K_m$  and  $V_{max}$  using Lineweaver-Burk plot? Explain

**Question No5.**

**(2X7=14)**

- a. Differentiate between A, B & Z forms of DNA
- b. Outline the pathway of pyrimidine biosynthesis.
- c. How does the catabolism of Purines take place?

**CENTRAL UNIVERSITY OF HARYANA**

Term End Examinations, March 2023

**Programme:** Microbiology  
**Course work** Ph.D.  
**Course Title:** Research Methodology  
**Course Code:** SIAS MB 02 01 01 C 4004

**Semester: I**

**Max. Time: 3 Hour**

**Max. Marks: 60**

**Instruction:** Attempt any five questions out of the following. Each question carries equal marks.

Q: 1. You have to take a throat sample for identification of a bacterial pathogen. What safety precautions will you follow while taking the sample? Which laboratory facilities/ containment levels are required to identify the pathogen through microbiological and molecular tools.

2. a) What is the role of IBSC, IAEC in approving the research projects for the safety of researchers.  
b) Write a brief note on disposal of biowaste and hazardous chemical waste generated in the laboratory

Q:3 Write about the layout of a Scientific Paper, explain in detail about each component, and mistakes to avoid in each component

Q:4 Write in detail about the factors to be taken into consideration while preparing for oral presentation through PPT and poster.

Q:5 Define the mean, median, mode and standard error their merits and demerits? Find the median of the following series. The hemoglobin percentage of animals was recorded 6,7,4,5,5,3 and 4 mg/100ml ?

Q:6 Write in details about the t-test and ANOVA with merits and demerits.

Q:7 What is research? How it is different from innovation? Describe one example of multi-disciplinary research problem having local, national and global perspective?

Q:8. Why to review literature? What is the major difference between forward and backward citations? What are the common sources of literatures for research?





**CENTRAL UNIVERSITY OF HARYANA**  
**First Semester Term End Examinations March 2023**

**Programme : M.Sc. Microbiology**

**Semester : First**

**Course Title : Essentials of Microbiology**

**Course Code : SIAS MB 1 1 03 C 3003**

**Session: 2022-23**

**Max. Time: 3 Hours**

**Max.Marks : 70**

**Instructions:** 1. *Question no. 1 has seven parts and students are required to answer any four. Each part carries three and half Marks.*

2. *Question no. 2 to 5 have three parts and student are required to answer any two parts of each question. Each part carries seven marks.*

Q 1. Short note on the following:

(4×3.5=14)

- a) Scope of Microbiology
- b) Germ theory of disease
- c) Quorum sensing
- d) Pathogenicity island
- e) Three domain concept of Carl Woese
- f) General characteristics of Archaea
- g) Key features of Methanococcus bacteria

Q 2.

(2×7=14)

- a) Describe contributions of Louis Pasteur or Robert Koch in the field of microbiology.
- b) Discuss various methods for long term preservation of microbial cultures. Give names of three microbial culture collections in India.
- c) Write principles, advantages, disadvantages and applications of various physical OR chemical methods of sterilization.

Q3.

(2×7=14)

- a) Write notes on (any two): (1) Evolutionary chronometers (2) Bergey's manual of systematic bacteriology (3) DNA hybridisation
- b) Discuss how nucleic acid sequencing is helpful in microbial taxonomy. Also draw the universal phylogenetic tree showing phylogeny of various domains of life.
- c) Describe various classical approaches to microbial taxonomy.

Q 4.

(2×7=14)

- a) Differentiate between Gram-positive and Gram-negative cell walls. Draw well labelled diagrams.
- b) Discuss the differences between Eubacteria and Archaeobacteria
- c) With the help of suitable examples and diagrams, discuss the structure and organisation of flagella in bacteria and archaea.

Q 5.

(2×7=14)

- a) What is biofilm? Discuss the role of biofilm and quorum sensing in microbial pathogenicity.
- b) Write an essay on horizontal gene transfer.
- c) Describe various methods of antimicrobial activities of biological molecules/drugs.

**CENTRAL UNIVERSITY OF HARYANA**

End Semester Examinations March 2023

**Programme: M.Sc. Microbiology**

**Session: 2022-23**

**Semester: First**

**Max. Time: 3 Hours**

**Course Title: Microbial Diversity**

**Max. Marks: 70**

**Course Code: SIAS MB 1 1 04 C 4004**

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**Instructions:**

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Q 1. Write short notes on the following: (4X3.5=14)

- a) Magnetosome
- b) Liquid Polysaccharides
- c) Single cell protein
- d) Asexual reproduction in fungi
- e) Structure & Classification of Paramecium
- f) Fungi as saprophytes
- g) Eutrophication

Q 2. (2X7=14)

- a) Differentiate between cell wall of Gram positive and Gram negative bacteria along with a well labelled diagram. Discuss the functions of different components of cell wall
- b) What are the different cellular structures which help the bacteria to move and attach to different substrates. Explain each of them
- c) What are different modes of nutrition in bacteria? Explain each with examples in each category

Q3. (2X7=14)

- a) Describe the classification of algae
- b) Explain the different symbiotic associations of algae with higher organisms. Describe these associations alongwith their significance
- c) Describe the different morphological types and reproduction mechanism of algae.

Q 4. (2X7=14)

- a) Explain the role of fungi in production of food, medicine and environment using suitable examples

- b) Describe the modes of nutrition and reproduction in fungi
- c) Discuss the different associations of fungi with other plants, animals and humans

Q 5.

(2X7=14)

- a) Discuss the life cycle and mode of infection of Trypanosoma
- b) Describe the classification of protozoa
- c) Explain the significance of protozoa in environment and how it is related to human health