CENTRAL UNIVERSITY OF HARYANA

End Semester Examinations April 2022

Programme: M.Sc. Microbiology **Session: 2021-22**
Semester: First **Max. Time: 3 Hours**
Course Title: Cell and Molecular Biology **Max. Marks: 70**
Course Code: SIAS MB 1 1 01 C 3003

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 a short note on (4X3.5=14)

a) P type and F type ATPases
b) ABC transporter
c) Smooth and skeletal muscle
d) G protein coupled receptors
e) COT curve
f) Central dogma of molecular biology
g) Prokaryotic RNA polymerase
h) Reverse transcriptase and transcription inhibition

Q 2. (2X7=14)

a) Write down the differences between eubacteria, eukaryote and archea. (7)
b) Write down the structure and functions of lysosome, ER, mitochondria, chloroplast and peroxisome. Explain fluid mosaic model of membranes (use diagram). (5+2)
c) Give example of secondary active transport and describe the mechanism. Differentiate between active and passive transport. Explain uniport, symport and antiport. (3+1+3)

Q3. (2X7=14)

a) Write down the position and function of gap junction, tight junction, desmosome, and plasmodesmata. (7)
b) What are the different cytoskeletal proteins? Write their functions. (7)
c) Write down the structure of cilia and flagella. Differentiate between bacterial and eukaryotic cell wall. What is the function of receptor tyrosin kinases? (3+3+1)

Q 4. (2X7=14)

a) Differentiate between DNA polymerase I, II and III. (7)
b) Write down 3 mutagenic agents with their mechanism of action. (7)
c) Write down about lampbrush and polytene chromosome. (7)

Q 5. (2X7=14)

a) Describe post transcriptional processing of RNA. (5+2)
b) Write down the proteins and enzymes involved in bacterial DNA replication with their function. (7)
c) Describe theta and rolling circle mode of DNA replication. (7)

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End Semester Examinations April 2022

Programme: M.Sc. Microbiology **Session: 2021-22**
Semester: First **Max. Time: 3 Hours**
Course Title: Principles of Biochemistry **Max. Marks: 70**
Course Code: SIAS MB 1102 C 3003

Instructions:

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

Q 1. (4X3.5=14)

a) What are anomers and epimers? Give one example of each.
b) Define glycolysis and gluconeogenesis. How acetyl CoA is produced from pyruvate?
c) Describe the competitive inhibition of enzymes and highlight the importance of enzyme inhibition in microbiology.
d) Explain any two disorders of purine and pyrimidine metabolism.
e) What are ketone bodies? How are these synthesized? Under what conditions are these overproduced?
f) Illustrate the clover leaf structure of tRNA and write its functions.
g) Differentiate between saturated and unsaturated fatty acids giving two examples of each. Also write down the structure and functions of phospholipids.

Q 2. (2X7=14)

a) Define homo- and heteropolysaccharides giving one example of each. Add a note on the structure and function of sucrose, cellulose and chitin.
b) Explain the reactions and importance of citric acid cycle.
c) Define glycogenesis and glycogenolysis. Describe the process of glycogenesis.

Q3. (2X7=14)

a) Explain the β-oxidation of a saturated fatty acid.
b) Describe the glycerophospholipids, shingolipids and sterols as structural lipids in membranes.
c) How fatty acids are synthesized?

Q 4. (2X7=14)

a) Describe the reactions and function of urea cycle.
b) How are enzymes classified according to the Enzyme Commission of International Union of Biochemistry (IUB)? Add a short note on K_m and V_{max}.
c) What are essential amino acids? Give a brief account of different levels of protein structure.

Q 5. (2X7=14)

a) What is a nucleotide? Describe the *de novo* biosynthesis of pyrimidine nucleotides.
b) Name the purine nucleotides found in DNA and RNA. Explain the catabolism of purine nucleotides.
c) Illustrate the double-helical model of DNA structure as proposed by Watson and Crick and mention the forces stabilizing this structure. What is Z-DNA?

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End Semester Examinations April 2022

Programme: M.Sc. Microbiology **Session: 2021-22**

Semester: First **Max. Time: 3 Hours**

Course Title: Techniques in Microbiology **Max. Marks: 70**

Course Code: SIAS MB 1 1 01 GEC 4004

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 any four of the following (4X3.5=14)

a) Filtration

b) Enrichment techniques

c) COD vs BOD

d) Microbial culture collections

e) Viable plate count

f) Biochemical characterization of microbes

g) Measurement of microbial metabolism

Q 2. (2X7=14)

a) Describe the instrumentation, principles and practice of asepsis.

b) Explain various microbiological culture media. Describe the techniques used for the isolation of bacteria.

c) Write a note on general setup of microbiological laboratory.

Q3. (2X7=14)

a) What is bright field microscopy? How it is different from dark field microscopy? Explain the principle and application of bright field microscopy.

b) Explain the principle and applications of transmission electron microscopy.

c) Explain different types of stains used in microbiology.

Q 4. (2X7=14)

a) Explain the methods for the determination of viable and total cell count.

b) How you will estimate the microbial biomass? Explain the turbidometry method for the determination of bacterial growth rate and generation time?

c) Describe the methods for estimation of microbial protein and enzyme activity.

Q 5. (2X7=14)

a) Write a note on phenotypic methods of bacterial characterization.

b) Explain the molecular biology tools used for the identification and characterization of microbes.

c) Describe the technique used for the characterization of non-culturable microbes.

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End Semester Examinations April 2022

Programme: M.Sc. (Microbiology) **Session: 2021-22**

Semester: First **Max. Time: 3 Hours**

Course Title: Virology **Max. Marks: 70**

Course Code: SIAS MB 1 1 05 C 3003

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. (4X3.5=14)

a) What is a virus, and how is it different from living microorganism?

b) Define the terms pock, bacteriophage, and necrotic lesion.

c) Explain functions of spikes in the virus life cycle.

d) What is the plant and animal viruses?

e) Describe nucleic acids of viruses.

f) What is the retroviruses?

g) How COVID-19 is different from normal influenza viruses?

Q 2. (2X7=14)

a) Give the contribution of virology in human health in last three decades.

b) Discuss the techniques for the cultivation of viruses. Define the terms tropism, bacteriophage, and necrotic lesion.

c) All four nucleic acid forms can serve as virus genomes. Describe each, the types of virion possessing it, and any distinctive physical characteristics the nucleic acid can have.

Q3. (2X7=14)

a) List some characteristics used in classifying viruses. Which seem to be the most important?

b) What is the plant and animal viruses? Discuss some plant viruses, which are important in respect of plant pathology.

c) What is oncogenic virus? Describe the types of oncogenic virus with their respective disease.

Q 4. (2X7=14)

a) What is interferon? Describe its mode of action during viral infection in human.

b) Briefly describe the course of an influenza infection and how the virus causes the symptoms associated with the flu. Why has it been difficult to develop a single flu vaccine?

c) Describe some clinical manifestations caused by the acute respiratory viruses.

Q 5. (2X7=14)

a) Describe the AIDS virus and how it cripples the immune system. How is the virus transmitted? What types of pathological changes can result?

b) What are the different causative viruses of hepatitis and how do they differ from one another? How can one avoid hepatitis?

c) Describe various types of antiviral compounds and their mode of action. How it differ from antibiotics?

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End Semester Examinations April 2022

Programme: M.Sc. Microbiology **Session: 2021-22**

Semester: First **Max. Time: 3 Hours**

Course Title: Microbial Diversity **Max. Marks: 70**

Course Code: SIAS MB 1 1 04 C 4004

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. (4X3.5=14)

a) Describe bacterial capsule, how it is different from slime layer

b) Write a short note on Phycobillins

c) What is eutrophication explain?

d) Describe Hormogonia in algae

e) What is heterothallism?

f) Write a short note on Foliose Lichens.

g) Write a short note on paraflagellar body in Euglena

h) Write a short note on Ectomycorrhiza.

i) Give a brief account on lipopolysaccharide in bacterial outer membrane.

j) What are the cyanobacteria?

Q 2. (2X7=14)

a) Describe cell wall of archaea. How it is different from prokaryotic cell wall?

b) Write a short note on caboxysomes and magnetosomes?

c) Write a short note on flagella, pili and cilia in bacterial cell.

Q3. (2X7=14)

a) Write a short note on occurrence and distribution of algae.

b) What is haplodiplobiontic alternation of generation, describe with suitable examples.

c) Write about the pigmentation in algae

Q 4. (2X7=14)

a) Write a short note on occurrence and distribution of fungi.

b) Write down the economic importance of fungi? Site the examples of fungi used in different industries?

c) Explain hyphal growth in fungi.

Q 5. (2X7=14)

a) Explain nutrition and locomotion in paramecium

b) Describe the role of protozoa in environment and its health implications

c) What do you mean by monogenetic and digenetic parasite? Describe trophozoite, pre-cystic and cystic stage of entamoeba.

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End Semester Examinations April 2022

Programme:	**M.Sc. Microbiology**	**Session: 2021-22**
Semester:	**First**	**Max. Time: 3 Hours**
Course Title:	**Essentials of Microbiology**	**Max. Marks: 70**
Course Code:	**SIAS MB 1 1 03 C 3003**	

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. (4X3.5=14)

a) Define Pili, and show it diagrammatically. Write its major role/s.

b) Draw a diagram of bacterial cell showing Pallisade and Sarcinae arrangements.

c) Fill in the blanks: Alternate name of peptidoglycan is _____ and it is located in the _____ space in Gram _____ bacteria. Bacteria are _____ (unicellular/multicellular) and _____ (form/don't form) spores.

d) Define bioluminescence giving suitable example.

e) Discuss germ theory of disease.

f) Describe horizontal gene transfer with suitable example.

g) Write full scientific names of 5 Gram negative bacteria

Q 2. (2X7=14)

a) Discuss pure culture techniques used in microbiology.

b) Describe the major contributions of Louis Pasteur and Robert Koch in the field of microbiology.

c) What was the spontaneous generation versus biogenesis controversy? Describe how this controversy was resolved.

Q3. (2X7=14)

a) Write a note on Bergey's Manual of Systematic Bacteriology. Discuss characteristic features of any one bacterial phylum as per Bergey's manual.

b) Describe the different approaches used in microbial taxonomy.

c) Discuss the three domain system of Carl Woese.

Q 4. (2X7=14)

d) Write general characteristics of archaebacterial. Also describe key features of any one model archaebacterial along with its full classification.

e) Draw a well labelled diagram of a bacterial cell showing all the internal and external structures.

f) Describe any one bacterial extracellular appendage (except Pili) in detail along with a suitable diagram.

Q 5. (2X7=14)

d) Describe various types of quorum sensing mechanisms in Gram negative bacteria.

e) Discuss antimicrobial activity testing using agar diffusion method.

f) Write a detailed note on pathogenicity islands.