

SEM I SET VI

(3 HOURS)

(100 marks)

N.B. (1) Attempt **all** questions. (2) Draw labeled diagrams wherever necessary.

**Q I A. Define the following terms:**

(5)

1. Amphitrichous flagella - **Flagellum present at each end of bacterium**
2. Lysosome - **lysosomes are spherical bodies involved in intracellular digestion and contain the enzymes, hydrolases needed to digest all types of macromolecules**
3. Cristae - **Mitochondria have several folds of the inner membrane called Cristae.**
4. Hypotonic solution - **Hypotonic solution is a solution with lower osmolarity than the cytosol, the cell swells as water enters.**
5. Racemic mixture- **It is an equimolar solution of the two enantiomers which shows no optical rotation**

**Q I B. State whether the following statement is true or false:**

(5)

1. The cell membrane in bacteria is the place where ATP production takes place - **TRUE**
2. PHB is an example of organic reserve material - **TRUE**
3. The rough endoplasmic reticulum is involved in the synthesis and transport lipids  
**False.**
4. Endocytosis is used to bring material into the cell from outside- **true.**
5. Amino acids are building blocks of nucleic acids - **False**

**Q I C. Give one example for each of the following:**

(5)

1. Cell wall less bacterium.. ***Mycoplasma, Ureaplasma, Sulfolobus***
2. Bacteria possessing gas vacuoles.. ***Thiothrix, Halobacterium, Cyanobacteria***
3. Plastid of eukaryotes - **chloroplast**
4. Chemical agents used for room decontamination- **Formaldehyde, beta-propiolactone.**
5. Pyrimidine - **Thymine, Cytosine and Uracil**

**Q I D. Select the correct alternatives and rewrite the statement.**

(5)

1. The NAG and NAM in peptidoglycan are held by a glycoside bond.
2. The cell membrane lipids are amphipathic
3. Fungal cell walls can be composed of chitin
4. Flagella of eukaryotic cells are made of microtubules
5. Nucleic acids are informational macromolecules.

**Q II . Answer briefly any two of the following:**

(20)

1. Discuss the bacterial flagella- Their arrangement, ultrastructure, mechanism of movement.. **Prescott 8<sup>th</sup> pages 55 to 58**
2. Write a short note on cytoplasmic matrix and cytoskeletal elements in Eukaryotes.  
**(Prescott 8<sup>th</sup> edition –page 83-84).**
3. Discuss hydrogen bonding in water and its role in giving water its unusual properties. Ans: Pg 47-49 Lehninger 4<sup>th</sup> edn.



**Q III. A. Answer briefly any three of the following:**

**(18)**

1. Compare and contrast between the cell membrane and cell wall of bacteria.

<b>Cell membrane</b>	<b>Cell wall</b>
Phospholipid bilayer with intrinsic and extrinsic proteins	Peptidoglycan
Moreover same in all prokaryotes	Differs in Gram positive and Gram negative bacteria
Permeability barrier	More open, only very large molecules are not permeable
Thinner layer	Thicker layer
Responsible for maintaining osmotic balance	Directly not involved in osmotic balance, but supports it
Responsible for ATP production, photosynthesis,	Does not participate in metabolic activities
No involvement in virulence	May be responsible as endotoxin for virulence
Primary function- osmotic balance, transport of nutrients	Primary function- Supports cell membrane, maintains shape and size

- Discuss the scope of medical microbiology and food microbiology. -**Elementary microbiology, Modi, pages-20,22**
- Discuss the efforts undertaken by scientists to prove germ theory. **Pelczar, pages 21,22**
- Explain the structure and function of bacterial nucleoid and ribosomes. **Prescott, 8 th ed, pages 44,45**
- Write a note on S- layer, pili and fimbriae. **Prescott, 8 th ed, pages 54, 55**
- Discuss briefly the various types of plasmids and state their significance. **Prescott, 8 th ed, pages 45,46**

**Q III B. Do as directed any two of the following:**

**(2)**

- Explain the term : Protoplast. **A bacterial cell that has lost the cell wall due to action of penicillin or lysozyme.**
- State the function of porin proteins. **allow passage of molecules smaller than 600 to 700 daltons**
- Name one chemical constituting the magnetosomes. - **magnetite (Fe 3 O 4 ) particles**
- State one component of bacterial cytoskeleton. **FtsZ, MreB**

**Q IV. A. Answer briefly any three of the following:**

**(18)**

- Distinguish between prokaryotic and eukaryotic cell (**Prescott 8<sup>th</sup> edition –page 96-97**).
- Nuclear envelope and nuclear pores. (**Prescott 8<sup>th</sup> edition –page 91-92**) .
- diagram of golgi apparatus (**Prescott 8<sup>th</sup> edition –page 85-86**).
- Write a short note on various levels of containment (**Mackie and McCartney- 295-296**).
- Diagram-ultrastructure of cilia and flagella (**Prescott 8<sup>th</sup> edition –page 95-96**).
- Discuss the structure and function of mitochondria (**Prescott 8<sup>th</sup> edition –page 88-89**).



**Q IV B. Do as directed any two of the following:**

**(2)**

1. Give 1 function of SER.  
SER – synthesise lipids
2. Give significance of HEPA filters.  
High efficiency particulate air filters is a type of air filter, which filters air and arrests all type of particulates and microbes.
3. pyrenoids : A pyrenoid is a dense region of protein surrounded by starch or polysaccharide which participate in polysaccharide synthesis.
4. Stack of thylakoid called grana.

**Q.V.A. Answer any three of the following**

**(18)**

1. Disaccharides and polysaccharides. [compare- both have monosacc, have glycosidic bonds, diff- size, soluble, mostly sweet, largely reducing sugar with exception of sucrose, not structural or storage function. Poly May be branched, can be conjugated, structural and storage, non reducing, insoluble ]
2. Zwitterion and amino acids. **Pg 78-80 Lehninger 4<sup>th</sup> edn.**
3. Differentiate between DNA and RNA

Ans

RNA	DNA
Genetic material in RNA viruses	Genetic material in most organisms
Of three types mRNA, tRNA and rRNA	No specific types
Pyrimidines are cytosine and Uracil	Pyrimidines are thymine and cytosine
Sugar is ribose	Sugar is deoxyribose
Building blocks-Ribonucleotides	Building blocks -Deoxyribonucleotides
Usually Single stranded	Usually double stranded
Acts as a template in translation	Acts as a template in replication of DNA and transcription
Used to transfer the genetic code from the nucleus to the ribosomes to make proteins. RNA is used to transmit genetic information in some organisms	The storage and transmission of biological information are the only known functions of DNA.

4. Electrovalence valence characterized by the transfer of one or more electrons from one atom to another with the formation of ions., types of bonds: **Pg 13-14 Lehninger 4<sup>th</sup> edn.**
5. Role of lipds and protein **Lehninger 4<sup>th</sup> edn**
6. Stereoisomerism . ' Modi

**Q V B. Attempt any two of the following:**

**(2)**

1. Erythrose, threose, erythrulose
2. Phospholipid
3. Hydrogen bonds
4.  $\text{CH}_3\text{CHNH}_2\text{COOH}$

