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SEM I .

(3 HOURS)

(100 marks)

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

Q1. A. Define the following terms:

(5)

1. **Chemotaxis** The pattern of microbial behavior in which the microorganism moves toward chemical attractants and away from repellents
2. **Autophagy**- It is a process by which cells selectively digest and recycle cytoplasmic components.
3. **Organelle** - A structure within or on a cell that performs specific functions and is related to the cell in a way similar to that of organs to the body of a multicellular organism.
4. **Conformation** A spatial arrangement of substituent groups that are free to assume different positions in space, without breaking any bond.
5. **Non-reducing sugar** When the anomeric carbon is involved in a glycosidic bond, that sugar residue cannot take the linear form and is a nonreducing sugar.

Q1 B. State whether the following statement is true or false:

(5)

1. Porins are present in both Gram positive and Gram negative bacteria **False**
2. *Clostridium* species is able to produce endospore **True**
3. The thylakoids are stacked on each other to form pyrenoid - **False**
4. Nucleolus plays a major role in ribosome synthesis - **True**
5. Cellulose is an example of a monosaccharide. **False**

Q1 C. Give one example for each of the following:

(5)

1. Sugar present in peptidoglycan **NAG, NAM**
2. Organism possessing metachromatic granules ***Corynebacterium diphtheria*,
Spirillum volutans, *Lactobacillus species***
3. Lipids present in plasma membrane of euc: sphingolipids, sterols, phosphoglycerides
4. Components of cell wall of photosynthetic protist - **cellulose, pectin**
5. Hexose **Glucose, Fructose, Galactose, Mannose**

Q1 D. Select the correct alternatives and rewrite the statement.

(5)

1. The LPS of Gram negative bacteria is capable of acting as **endotoxin**.
2. **Histones** are absent in bacterial nucleoid.
3. ER is the major site for cell membrane synthesis .
4. The **ribosome** plays a major role in protein synthesis
5. Nucleic acids have **phosphodiester** bond between their nucleotides.

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Q II. Answer briefly any two of the following: (20)

1. Explain the structure of a bacterial endospore and discuss the underlying reasons for its unusual properties... **Prescott, 8th ed, pages 60- 63**
2. Compare and contrast between prokaryotic cell and eukaryotic cell. (**Prescott 8th edition –page 96-97**).
3. Give a brief account of general features and biological role of peptides and proteins
Ans: Pg. 85-88 Lehninger

Q III. A. Answer briefly any three of the following: (18)

1. Draw a neat labelled diagram to explain the structure of Gram positive bacterial flagellar basal body.. **Prescott, 8th ed, pages 55-56**
2. Discuss the Koch's postulates using the example of *Mycobacterium tuberculosis*..
Prescott, 8th ed, page 9
3. Differentiate between the cell wall of Gram positive and Gram negative bacteria with respect to six points. **Prescott, 8th ed, pages 47-51**
4. Discuss the following: Magnetosomes and Gas vesicles of bacteria.. **Prescott, 8th ed, pages 43-44**
5. Discuss bacterial pili and fimbriae.. **Prescott, 8th ed, pages 42 and 55**
6. Write a note on : Bacterial nucleoid. **Prescott, 8th ed, pages 44**

III B. Do as directed any two of the following: (2)

1. Name the scientist who discovered phagocytosis.. **Elie Metchnikoff**
2. State one function of bacterial capsule.. **Protection , prevention of phagocytosis, storage of water and carbohydrate, virulence**
3. State the role played by Braun's lipoproteins.. **It covalently links the outer LPS layer to the peptidoglycan.**
4. Name one spiral shaped bacterium. ***Rhodospirillum rubrum, Treponema pallidum, Borrelia buccalis, Spirillum volutans***

Q IV. A. Answer briefly any three of the following: (18)

1. Explain the structure and role of chloroplast in Eukaryotes (**Prescott 8th edition – page 90**). [structure 4 marks, 2 for role]
2. Write a short note on Golgi apparatus (**Prescott 8th edition –page 85-86**).
3. Explain the role of cytoskeletal elements in a eukaryotic cell (**Prescott 8th edition – page 83-84**). [2 marks for each]
4. Write a short note on laboratory acquired infections and practices to prevent them (**Mackie and McCartney- 290-292**).
5. Explain chromatin and nuclear envelope of euc. nucleus (**Prescott 8th edition –page 91-92**).
6. Draw a neat labelled diagram of mitochondrial structure (**Prescott 8th edition –page 88-89**). [1mark for each label, 1 mark for mitochondria]

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

(2)

1. State the role of pellicle in eukaryotic cell.
They are rigid layer and give their possessors a characteristic shape.
2. Give the significance of phagocytosis.
It is a process where the protrusions from the cell surface surround and engulf particulates. It is carried out by immune system cells and eukaryotic microbes.
3. Define SER.
Endoplasmic reticulum which lack ribosomes are called Smooth endoplasmic reticulum.
4. State the function of proteasome.
Protein structures that are misfolded in a eukaryotic cell are secreted in cytosol, marked and degraded by 26S proteasome.

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

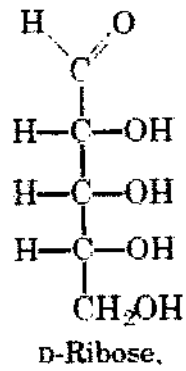
(18)

1. Write a short note on fatty acids
Definition, (1 mark) general structure of fatty acid (1), types of fatty acids-saturated & unsaturated (2), features and examples (2)
2. Discuss different amino acid based on the polarity of their R group.
Ans Pg 78-80 Lehninger 4th edn
3. Briefly discuss the constituents of nucleotides.
Ans: Nucleotides have three characteristic components: (1) a nitrogenous (nitrogen-containing) base, (2) a pentose, and (3) a phosphate. The molecule without the phosphate group is called a **nucleoside**. The nitrogenous bases are derivatives of two parent compounds, **pyrimidine** and **purine**. 273-274 **Lehninger 4th edn**
4. Write a note on disaccharides.
Ans: Pg 245-246 Lehninger 4th edn
 - Disaccharides (such as maltose, lactose, and sucrose) consist of two monosaccharides joined covalently by an **O-glycosidic bond**, which is formed when a hydroxyl group of one sugar reacts with the anomeric carbon of the other.
 - Glycosidic bonds are readily hydrolyzed by acid but resist cleavage by base. Disaccharides can be hydrolyzed to yield their free monosaccharide components by boiling with dilute acid.
 - The disaccharide maltose contains two D-glucose residues joined by a glycosidic linkage between C-1 (the anomeric carbon) of one glucose residue and C-4 of the other. Because the disaccharide retains a free anomeric carbon, maltose is a reducing sugar.
5. Discuss any three bonds with their importance. [glycosidic, peptide, ester, thioester, phosphodiester- in polymers and phosphate esters of sugars in metabolism, thioester for CoA in fatty acid oxidation... as taught in class]
6. Justify the statement 'Hydrogen bonding gives water its unusual properties'.
Ans: Pg 47-49 Lehninger 4th edn

Q V B. Attempt any two of the following:

(2)

1. Write the structure of D-ribose



2. Structural polysaccharide: cellulose, peptidoglycan, chitin
3. Unusual nuc in tRNA: pseudouridine, methylguanosine, ribithymidylic acid
4. Phospholipid: lecithin, phosphatidylethanolamine, phosphatidylserine, phosphatidylcholine