Question Bank

Unit I- Membrane transport

Q.1 Choose the correct alternative **(each carry 1 marks)**

1) In the passive diffusion, solute molecules cross the membrane as a result of
   a) Concentration difference
   b) Ionic difference
   c) Pressure difference
   d) All of these
2) The membrane protein on the surface are ___ proteins.
   a) Transmembrane
   b) Intrinsic
   c) Peripheral
   d) None of the above
3) The fluid mosaic model was developed by
   a) Singer
   b) Watson
   c) Nicolson
   d) Both a) and c)
4) Which of the following is an example of primary active transport?
   a) Cl^- - HCO_3 exchange
   b) Na^+- H^+ exchange
   c) Na^+ K^+ ATPase
   d) Na^+-Ca^{2+} exchange
5) The sodium pump
   a) Exchange extracellular Na^+ for intracellular K^+
   b) Is an ion channel
   c) Is important for maintaining a constant cell volume
   d) Can only be inhibited by metabolic poisons
6) Select the correct statement regarding facilitated diffusion
   a) It is a selective process
   b) It increases with increase in temperature
   c) It is passive diffusion
   d) All the above
7) The difference in the concentration of a substance from one location to another is called as _____
   a) Diffusion
   b) Passive transport
   c) Osmosis
   d) Concentration gradient
8) Which of the following transport only one kind of substance?
   a) Uniport carrier
   b) Symport carrier
   c) Antiport carrier
   d) Membrane protein
9) Which is an example of active transport
   a) Exocytosis
   b) Sodium potassium pump
   c) Endocytosis
   d) All of these
10) Osmosis is an example of
   a) Active transport
   b) Passive transport
   c) Both a and b
   d) None of these

Q.2 Fill in the blanks **(each carry 1 marks)**

1) In fluid mosaic model, head are <u>hydrophilic</u> in nature.

2) In diffusion, molecules move from the region of high concentration to low concentration.
3) The passage of only solvent molecules across biological membrane is known as osmosis.
4) In fluid mosaic model, the fatty acyl tail is hydrophobic in nature.
5) The Na^+K^+ pump actively pumps three Na^+ ions out of the cell and two K^+ ions into cell per ATP hydrolysed.
6) Group translocation is a form of active transport.
7) Protein lipid protein model is known as Danielle and Davson.
8) Singer and Nicolson proposed fluid mosaic model.
9) Extrinsic proteins are also known as peripheral proteins.
10) The plasma membrane is made up of lipids and proteins.

Q.3 Answer in one sentence (each carry 1 marks)

1) Who proposed the fluid mosaic model?

Ans: The fluid mosaic model was proposed by Singer and Nicolson.

2) Define Passive diffusion.

Ans: Passive diffusion is the process by which molecules diffuse from a region of higher concentration to a region of lower concentration.

3) Give two types of cellular transport.

Ans: The two types of cellular transport are passive transport and active transport.

4) Define Active transport.

Ans: Active Transport is defined as a process that involves the movement of molecules from a region of lower concentration to a region of higher concentration against a gradient with the use of external energy.

5) What is mean by facilitated diffusion?

Ans: Facilitated diffusion is the passive movement of molecules along the concentration gradient. It is a selective process, i.e., the membrane allows only selective molecules and ions to pass through it.

6) Define osmosis.

Ans: Osmosis is a process of movement of solvent through a semi-permeable membrane from a region of lower solute concentration to higher solute concentration.

7) In NaK^+ pump how many Na ions are transported across the membrane?

Ans: The Na^+K^+ pump actively pumps three Na^+ ions out of the cell and two K^+ ions into cell.

8) Write any two functions of transmembrane proteins.

Ans: i. It helps in transport of molecules across the membrane.
ii. It helps in chemical signalling across the cell.

9) Name the different models of biological membrane.

Ans: the different models of biological membrane are: 1. Fluid mosaic model, 2. Sandwich model.

10) Give example of Uniport.

Ans: An example of a uniporter is the glucose transporter (GLUT) in found in erythrocytes.

Q.4 Short answer questions (each carry 4 marks)

1) Describe in brief various transport across the biological membrane.
2) Describe Bulk transport.
3) Give an outline of Active transport.
4) Illustrate the Na^+K^+ pump.
5) Distinguish between active and passive transport.
6) Give the outline of different carrier model.
7) Illustrate liposomes mediated transport across the cell membrane.
8) Describe in brief the any one active transport.

Q.5 Long answer questions (each carry 8 marks)

1) Describe in detail the ABC transporter in *E. coli.*
2) Illustrate the comparison of passive transport and active transport.
3) Describe in detail the fluid mosaic model of cell membrane.
4) Explain group translocation with a suitable example.
5) Elaborate any two biological membrane model and state their advantages and limitations.
6) Describe in detail various carrier models and Na^+K^+ pump.
7) Discuss in brief facilitated diffusion.
8) Describe in detail types of cellular transport.
9) Describe in brief the transport of glucose from stomach across the intestinal lumen.


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Unit II: Energy metabolism

Q.1 Choose the correct alternative

1. Which of the following law of thermodynamics states that "energy can neither be created nor be destroyed"
   A. First Law
   B. Second Law
   C. Third Law
   D. None of the Above
2. The standard free energy for 1 mole of ATP on hydrolysis to ADP and iP ___.
   A. 7.3 KJ
   B. -10KJ
   C. -7.3 Kcal
   D. +7.3 Kcal
3. ____ is the energy currency of the cell.
   A. Glucose
   B. Phosphate
   C. ATP
   D. ADP
4. The biosynthesis of complex compounds from simple molecules is termed as
   A. Anabolism
   B. Catabolism
   C. Metabolism
   D. None of these
5. The ΔG^0 stands for
   A. Free energy
   B. Standard free energy
   C. Gravity
   D. None of these
6. If the reaction proceeds in forward direction, its ΔG^0 is
   A. Positive
   B. Negative
   C. Neutral
   D. None of the above
7. Gibbs energy change ΔG is related to equilibrium constant K as
   A. $\Delta G° = -RT \ln K$
   B. $\Delta G° = RT \ln K$
   C. $\ln K = - RT/\Delta G°$
   D. None of the Above
8. If the reaction proceeds in backward direction, its ΔG^0 is
   A. Positive
   B. Negative
   C. Neutral
   D. None of the above
9. The reaction is said to be at equilibrium when the ΔG^0 is
   A. Positive
   B. Negative
   C. Zero
   D. None of the above
10. The value of K_{eq} for a reaction with - ΔG^0 is
    A. 1
    B. Greater than 1
    C. Less than 1
    D. None of these
11. One calorie is equal to ___ joules.
    A. 418

B. 4.18
C. 1000
D. None of these

12. Which of the following compound on hydrolysis yields highest amount of free energy?
A. Phosphoenolpyruvate
B. ATP
C. ADP
D. AMP

Q 2. Fill in the blanks

1. The ATP stands for Adenosine Tri-Phosphate.
2. The ATP on hydrolysis yields energy due to presence of phospho-anhydride bond.
3. The formation of ATP occurs inside the cell in mitochondria.
4. The concept of free energy was given by Gibbs.
5. The energy of randomness or that is unavailable in a system is known as entropy.
6. In active transport, ATP is utilized.
7. For spontaneous reactions, free energy is always negative.
8. The entropy increases with increasing spontaneity of a reaction.
9. The process in which a substance accepts electrons is termed as reduction.
10. In thermodynamics, the universe comprises of system and surrounding.

Q 3. Answer in one sentence 1M

1. Explain High energy compounds?

Ans: High energy compounds are compounds that release a large amount of energy during respiration.

2. Give any two applications of free energy.

Ans: i. It helps to measure the work done by a system.
ii. It determines the spontaneity of a reaction.

3. Write the mathematical equation that derives relationship between ΔG° and Keq.

Ans: $\Delta G° = -RT\ln K_{eq}$
where,
ΔG° is standard free energy,
Keq is equilibrium constant

4. Define free energy.

Ans: Gibbs free energy is defined as a measure of amount of energy available for work done in a thermodynamic system.

5. What is entropy?

Ans: Entropy is defined as a measure of randomness or disorder of a system.

6. State the first law of thermodynamics.

Ans: The First law of thermodynamics states that energy can neither be created nor be destroyed, it can only be converted from one form to another.

7. Write the mathematical equation that derives relationship between ΔG, ΔH and entropy change.

Ans: $\Delta G = \Delta H - T\Delta S$
Where,
ΔG is the change in Gibbs free energy for a system,
ΔH is the change in enthalpy,
ΔS is the change in entropy.

8. The ΔG^0 of a biochemical reaction occurring spontaneously will be?

Ans: The ΔG^0 of a biochemical reaction occurring spontaneously will be negative.

9. If a reaction is having ΔG^0 value -20, then what will be the fate of reaction?

Ans: If ΔG^0 value of a reaction is negative (-20), it will be spontaneous.

10. Define substrate level phosphorylation. Give an example.

Ans: It is a type of biochemical reaction that results in the formation of adenosine triphosphate (ATP) by the direct transfer of a phosphate group to adenosine diphosphate (ADP) from an intermediate substrate.

11. Give an example substrate-level phosphorylation.

Ans: In the pay-off phase of glycolysis, when two 1,3-bisphosphoglycerate are converted to 3-phosphoglycerate two ATP are produced by substrate-level phosphorylation.

Q. 4 Short answer type questions (4M)

1. Comment on phosphate group transfer potential. Illustrate it with an example.
2. Describe in detail energy rich bonds.
3. Draw the structure of ATP. Give an outline of free energy.
4. Explain why ATP is used as energy currency of the cell.
5. Explain the mechanism by which ATP-ADP concentration is maintained inside the Mitochondrial matrix?
6. Explain the substrate level phosphorylation. How does it aid in ATP production?

Q. 5 Long answer type questions (8M)

1. State and explain the laws of thermodynamics with respect to free energy.
2. Describe in detail the ATP cycle. How does free energy.
3. Illustrate the standard free energy of hydrolysis of phosphate compounds.
4. Comment on free energy change in a biochemical reaction.
5. Explain standard free energy of hydrolysis of ATP and enlist some examples of biologically important high energy compounds.
6. Comment on phosphagens. Illustrate some phosphagens with suitable examples.
7. Describe in detail biological energy transducers.

Unit III: Bacterial and Mitochondrial respiration

Q.1 Choose correct alternative **(each carry 1 marks)**

1. The site of aerobic respiration in eukaryotic cells is_____
a) Peroxisome
b) Plastid
c) Mitochondria
d) Cilia

2. How do the H+ ions pass through the outer membrane of mitochondria?
a) ATPase pump
b) Carrier protein
c) Channels
d) Porins

3. ETC occurs in the___ site of mitochondria.
a) Matrix
b) Cytosol
c) **inner membrane**
d) None of the above

4. The charge on matrix of mitochondria is ____.
a) negative
b) positive
c) Neural
d) None of the above

5. In the ____ of mitochondria, the concentration of H^+ ions are more.
a) cytosol
b) matrix
c) inner membrane
d) None of the above

6. Which of the following is the correct sequence of electron acceptors in ETC for production of ATP?
a) Cyt b, c, a, a3
b) Cyt a, a, b, c
c) Cyt c, b, a, a3
d) Cyt b, c, a_3, a

7. Which of the following terminal cytochromes is responsible for donating electrons to oxygen?
a) Cyt a_3
b) Cyt b
c) Cyt c
d) Cyt a_1

8. Which of the following is the Complex III of ETC?
a) NADH dehydrogenase
b) Cytochrome aa_3
c) Cytochrome bc_1
d) ATP synthase

9. Which of the following inhibits the complex IV of ETC?
a) Valinomycin
b) Peiricidin A
c) Cyanide
d) None of the above

10. The total number of protons pumped by complex IV is ___.
a) Four
b) Ten
c) Eight
d) Two

Q.2 Fill in the blanks **(each carry 1 marks)**

1. In the mitochondrial ETC, the complex I pumps four protons.

2. $NADH_2$ donates the electrons, FMN is the first compound in the complex I that accepts it.
3. The mitochondrial ETC comprises of total four complex/s.
4. The Coenzyme Q is a mobile carrier for electrons that connects complex I and III.
5. The NADH dehydrogenase is an oxidoreductase enzyme.
6. The FADH dehydrogenase donates the electrons to complex II.
7. In the mitochondrial ETC, total ten protons are pumped across the membrane.
8. The Coenzyme Q/UQ is a mobile carrier that transports electrons from complex I to Complex III.
9. The oxygen is the terminal acceptor of electrons in the ETC.
10. In complex I, the Fe-S proteins pumps the protons across the membrane.

Q.3 Answer in one sentence **(each carry 1 marks)**

1. Define aerobic respiration?

Ans: Aerobic Respiration is the process of cellular respiration that takes place in the presence of oxygen.

2. In glycolysis, the reducing equivalents produced that enters the ETC is?

Ans: The reducing equivalent produced in glycolysis that enters the ETC is $NADH_2$.

3. Define Reduction?

Ans: Reduction can be defined as the process of gain of electron/loss of oxygen/gain of Hydrogen by a compound.

4. Define Oxidation?

Ans: Oxidation can be defined as the process of loss of electron/gain of oxygen/loss of Hydrogen by a compound.

5. Give an example of inhibitor of Complex I.

Ans: Piericidin A, Rotenone etc are some inhibitor of Complex I in ETC.

6. Define ionophores. Write any one example of it.

Ans: Ionophores are a class of compounds that form complexes with specific ions and facilitate their transport across cell membranes. Momensin is an example of ionophore.

7. CO inhibits the ETC at which complex.

Ans: CO inhibits the ETC at complex IV by binding at ferrous haeme a_3.

8. The oxidoreductase belongs to which class of enzymes?

Ans: The oxidoreductase belongs to class I of enzymes.

9. Write the total number ATP/s formed by NADH and $FADH_2$ respectively?

Ans: the total number ATP/s formed by NADH is three and by $FADH_2$ is two.

10. Oxidative phosphorylation occurs in which part of the cell?

Ans: Oxidative phosphorylation occurs in mitochondria of the cell.

11. Name the mobile carrier in the ETC which contains Fe^{2+} as central metal ion.

Ans: Cytochrome c is the mobile carrier in the ETC which contains Fe^{2+} as central metal ion.

Q.4 Short answer questions **(each carry 4 marks)**

1) Differentiate between bacterial and mitochondrial respiration.
2) Discuss on generation of ATP in bacteria.
3) Illustrate the oxidation reduction enzymes.
4) Describe the Complex I and II bacterial respiration.
5) Give an outline of bioenergetics of mitochondrial ETC.
6) Give an outline about electron transport chain in mitochondria.
7) Describe the chemiosmotic coupling hypothesis.
8) State the evidences that were in favour of the chemiosmotic coupling hypothesis.
9) Describe the conformational coupling hypothesis.
10) Describe the chemical coupling hypothesis.

Q.5 Long answer questions **(each carry 8 marks)**

1) Describe the various oxidoreductases and illustrate their role in mitochondrial ETC.
2) State and explain chemiosmotic coupling theory.
3) Explain the four molecular complexes involved in respiratory chain of mitochondria.
4) Explain in brief respiration linked proton translocation.
5) Explain in detail electron transport chain in mitochondria.
6) Describe about the structure of Flavoproteins and their role in ETC.
7) Describe about the structure of NADH and its role in ETC.
8) Describe about structure and functions of the Ubiquinone(UQ) in mitochondrial ETC.


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Unit IV: Oxidative phosphorylation

Q.1 Choose correct alternative **(each carry 1 marks)**

1) The ATPase found in mitochondria is
   - **a. F type**
   - b. P type
   - c. V type
   - d. None of the above
2) Where does oxidative phosphorylation take place.
   - a. Ribosomes.
   - **b. Mitochondria.**
   - c. Nucleus.
   - d. cell membrane.

3) Which high energy intermediate can generate more ATP through the electron transport chain?
   - a. NADH
   - b. FADH
   - **c. Both NADH & FADH**
   - d. NADPH

4) NADH dehydrogenase is in which of the following areas?
   - a. Cytosol
   - b. Intermembrane space
   - c. Cell wall
   - **d. Inner mitochondrial membrane**

5) Complex II in ETC is also known as
   - a. NADH dehydrogenase
   - **b. succinate dehydrogenase**
   - c. ubiquinone oxidoreductase
   - d. cytochrome c reductase

6) The last complex in ETC is
   - **a. cytochrome c oxidase**
   - b. NADH dehydrogenase
   - c. ubiquinone oxidoreductase
   - d. cytochrome c reductase

7) The number of H+ ions required to produce 1 ATP by ATP synthase are
   - a. 2
   - b. 3
   - **c. 4**
   - d. 5

8) ATP synthase contain the following subunits
   - a. F1,F2
   - b. F2,F_0
   - **c. F_0,F_1**
   - d. F2 only

9) Which of the following is <u>not</u> produced during electron transport chain?
   - **a. carbon dioxide**
   - b. water
   - c. ATP
   - d. FAD

10) Where exactly does oxidative phosphorylation take place in the cell?
   - **a. Inner mitochondrial membrane**
   - b. Outer mitochondrial membrane
   - c. Grana of chloroplast
   - d. Stroma of chloroplast

11) Which of the following complexes of ETC is not responsible for the pumping out of protons from the mitochondrial matrix?
   - a. Complex I

b. Complex III
c. Complex II
d. Complex IV

12) What enzyme in the ETC is responsible for generating the ATP molecules?
a. GTPase
b. ATP synthase
c. Hexokinase
d. None of the above

Q.2 Fill in the blanks **(each carry 1 marks)**

1. The electron transport chain generates the chemiosmotic gradient by pumping protons.
2. The last electron acceptor in ETC is oxygen.
3. The central component of the cytochrome capable of redox reactions is Iron.
4. NADH donates its electrons to the NADH dehydrogenase complex.
5. In complex II, $FADH_2$ donates its electron to ubiquinone/Coenzyme Q.
6. Electron transport chain occurs in mitochondria.
7. ATP-synthase is the ATP producing protein in oxidative phosphorylation.
8. Valinomycin is an uncoupler of ETC that forms channel in the membrane.
9. Riboflavin (B2) vitamin acts as co factor in ETC.
10. The removal of the hydrogen ions from the system contributes to the ion gradient.

Q.3 Answer in one sentences **(each carry 1 marks)**

1. Define electron transport chain.

Ans: The electron transport chain is a protein cluster that transfers electrons through a membrane within the mitochondria to establish a proton gradient.

2. Define Oxidative phosphorylation.

Ans: Oxidative phosphorylation is the process by which ATP synthesis occurs which is coupled to the movement of electrons through the mitochondrial electron transport chain and ATP synthase.

3. Enlist the end products of mitochondrial ETC.

Ans: The end products of ETC are namely H_2O, NAD^+, FAD and H^+ ions.

4. Define electrochemical gradient.

Ans: An electrochemical gradient is a gradient of electrochemical potential that is generated due to movement if ions across the membrane.

5. Name the coupling hypothesis that is based on the involvement of an high energy intermediate carrier molecule.

Ans: The chemical coupling is based on the involvement of an high energy intermediate carrier molecule.

6. Name the scientist who proposed the chemiosmotic coupling hypothesis.

Ans: The chemiosmotic coupling hypothesis was proposed by Peter Mitchell.

7. Name any one uncoupler of ETC and oxidative phosphorylation.

Ans: Valinomycin is an uncoupler of ETC and oxidative phosphorylation.

8. State the full form of NAD

Ans: NAD stands for Nicotinamide Adenine Dinucleotide

9. Define concentration gradient

Ans: Concentration gradient refers to the gradual change in the concentration of solutes in a solution.

10. Name terminal electron acceptor in the ETC.

Ans: The terminal electron acceptor in ETC is an oxygen molecule.

Q.4 Short answer questions **(each carry 4 marks)**

1) Define ionophores. Explain with examples.
2) Describe mitchell's hypothesis of generation of electrochemical gradient.
3) Explain uncouplers; Give example with their mode of action.
4) Explain substrate phosphorylation.
5) Draw a well labelled diagram of F0F1 ATPase showing catalytic site for ATP synthesis and H^+ channel and explain it in brief.
6) Give an outline of conformational coupling mechanism of oxidative phosphorylation.
7) Explain in brief about P:O ratio and respiratory control.
8) Give on details of sites of ATP generation.

9) Explain role of electron transport chain in oxidative phophorylation.

Q.5 Long answer questions **(each carry 8 marks)**

1) Describe oxidative phosphorylation
2) Comment on enzymatic reactions that involve chemical reaction and transport process.
3) Take concise account on mechanism of coupling and uncouplers.
4) Explain in brief chemiosmotic coupling mechanism.
5) Discuss about substrate level phosphorylation.
6) Describe Mitchell's hypothesis.
7) Describe inhibitors of oxidative phosphorylation.

Unit V: Microbial photosynthesis

Q.1 Choose correct alternative **(each carry 1 marks)**

1. In plants, the type of photosynthesis that occurs is/are
a) Cyclic
b) Non-cyclic
c) Oxygenic
d) Both (b) and (c)

2. The process of photosynthesis is
a) Reductive
b) Endergonic
c) Anabolic
d) All of the above

3. Anoxygenic photosynthesis is performed by
a) plants
b) blue green algae
c) lichen
d) green sulphur bacteria

4. 90% of the photosynthesis is performed by
a) xerophyte
b) fungi
c) lichen
d) aquatic algae and cyanobacteria

5. In oxygenic photosynthesis, the oxygen liberated comes from
a) water
b) Hydrogen sulphide
c) Carbon dioxide
d) None of the above

6. The first step in the process of photosynthesis is
a) absorption of sunlight
b) synthesis of glucose
c) conversion of light energy to chemical energy
d) Release of oxygen

7. The photosynthetic system chiefly comprises of
a) chlorophyll a
b) chlorophyll b
c) xanthophyll
d) carotenes

8. The photosynthetic pigments uniquely present in algae is
a) phycobilin
b) chlorophyll a
c) xanthophyll
d) carotenes

9. Which of these features is not true about chlorophyll?
a) It has Mg^{2+} as the central metal ion
b) It has cyclopentanone ring fused with a pyrrole ring
c) It has a planer tetrapyrrole ring structure
d) It is water-soluble pigment

10. The PS I show maximum absorption at ___nm.
a) 700
b) 680
c) 480
d) 600

Q. 2 Fill in the blanks **(each carry 1 marks)**

1. The Glyoxylate cycle occurs in peroxisomes.
2. Heliobacteria performs anoxygenic photosynthesis.
3. In cyclic photophosphorylation, oxygen is not evolved.
4. The bacteriochlorophyll can absorb light is the infrared region only.
5. Purple Sulphur bacteria utilizes sulphur containing compound as chemical reductant.
6. During the photosynthesis, protons are transported from stroma to thylakoid.
7. The RuBisCO enzyme is the most abundant enzyme found in plants.
8. Glyceraldehyde 3 P is the final product of Calvin cycle.
9. In calvin cycle, fixation of Carbon dioxide occurs.
10. In Halobacterium, bacteriorhodopsin is the pigment that absorbs light energy.

Q.3 Answer in one sentence (each carry 1 marks)

1. Name the photosynthetic pigment present in Halobacterium.
Ans: Bacteriorhodopsin is the photosynthetic pigment present in Halobacterium.
2. Enlist the end products of non-cyclic photophosphorylation.
Ans: 1. ATP, molecular oxygen, protons and $NADPH_2$.
3. Name the type of photosynthesis in which oxygen is evolved.
Ans: Oxygenic photosynthesis is the type of photosynthesis in which oxygen is evolved.
4. The RuBisCO enzyme plays an important role during which phase of photosynthesis?
Ans: The RuBisCO enzyme plays an important role during dark phase (Calvin cycle) of photosynthesis.
5. Write the PS unit required in cyclic and non-cyclic photosynthesis.
Ans: In non-cyclic photosynthesis, both PS I and PS II are required while in the cyclic photosynthesis only PS I is present.
6. Write the first step in cyclic photosynthesis.
Ans: Absorption of sunlight by PS I thereby its excitation is the first step in cyclic photosynthesis.
7. Name the first stable compound in TCA cycle.
Ans: Citrate is the first stable compound in TCA cycle.
8. The total turns required of calvin cycle for synthesis of one glucose molecule will be?
Ans: Six turns of calvin cycle are required for synthesis of one glucose molecule.
9. Write any two factors that elevates the RUBisCO activity.
Ans: ATP and light are the that elevates the RUBisCO activity
10. Name any two accessory pigments in photosynthesis.
Ans: Carotenoids and Xanthophylls are some accessory pigments in photosynthesis

Q.4 Short answer questions (each carry 4 marks)

1) Distinguish between PSI and PSI
2) Discuss about CO2 fixation in bacterial photosynthesis.
3) Give an outline about halobacterial photosynthesis.
4) Describe oxygenic photosynthesis.
5) Outline the components of photosynthetic electron transport system in the bacterial chromatophore membrane.
6) Discuss about anoxygenic photosynthesis.
7) Describe various photosynthetic pigments with well labelled diagrams.
8) Explain schematically the reductive pentose pathway.
9) Distinguish between anoxygenic and oxygenic photosynthesis.
10) Describe the mechanism of photosynthesis.

Q.5 Long answer questions (each carry 8 marks)

1) Describe structure of photosynthetic pigments.
2) Describe the different Chlorophylls in bacteria.
3) Describe in brief Non-cyclic photophosphorylation.
4) Describe in brief Cyclic photophosphorylation.
5) Explain electron transport in chromatiaceae.
6) Explain the stages of CO2 fixation.
7) Comment on archaebacterial photosynthesis.

8) Explain in detail the harvesting light energy by eubacteria.
9) Explain in detail halobacterial photosynthesis.
10) Describe reductive pentose pathway of CO_2 utilisation.