

**CLASS XI
BIOLOGY (044)**

Maximum Marks: 70

Time: 3 hours

General Instructions:

- (i) All questions are compulsory.
- (ii) The question paper has five sections and 33 questions. All questions are compulsory.
- (iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
- (iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.
- (v) Wherever necessary, neat and properly labeled diagrams should be drawn

SECTION A

1. Each part of plant breathes on its own. Roots of plants in haline marshy soil get suffocated if these do not have
 - a. Mycorrhizae
 - b. Pneumatophores
 - c. Haustoria
 - d. Rhizoids
2. Given below are some bacteria and their shapes. Select the correct match

	Bacteria		Shape
A	<i>Lactobacillus</i>	i	Comma
B	<i>Streptococcus</i>	ii	Spherical
C	<i>Vibrio cholerae</i>	iii	Rod
		iv	Spiral

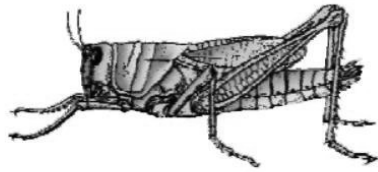
- a. A-i, B-ii, C-iv
 - b. A-iii, B-ii, C-i
 - c. A-iii, B-iv, C-ii
 - d. A-ii, B-iii, C-iv
3. Given below are different sub-stages of prophase I. Match them with their correct feature.

	Column I		Column II
I	Zygotene	i	Formation of bivalent
II	Pachytene	ii	Terminalization of chiasmata
III	Diakinesis	iii	Dissolution of synaptonemal complex
IV	Leptotene	iv	Crossing over mediated by recombinase
V	Diplojene	v	Chromosomes start condensing

- a. I-v, II-i, III-iv, IV-iii, V-ii
- b. I-i, II-iii, III-ii, IV-v, V-iv
- c. I-i, II-iv, III-ii, IV-v, V-iii
- d. I-v, II-iv, III-ii, IV-i, V-iii

4. Which of the following cells of an adult will **NOT** exhibit mitosis?
 - a. Blood cells
 - b. Cells lining the gut
 - c. Heart cells
 - d. Cells of upper layer of epidermis
5. Choose the **INCORRECT** statement/statements.
 - i. *Gelidium* belonging to class Rhodophyceae yields Agar.
 - ii. *Chlorella* belonging to class Phaeophyceae is a rich source of protein.
 - iii. *Laminaria* belonging to class Phaeophyceae is used as sea food.
 - iv. *Porphyra* belonging to class Chlorophyceae is used in preparation of ice creams.
 - a. i only
 - b. iii only
 - c. ii and iii
 - d. ii and iv
6. Circular DNA is found in
 - a. mitochondria, chloroplast, nucleus
 - b. nucleoid, mitochondria, nucleolus
 - c. bacteria, mitochondria, chloroplast
 - d. nucleoid, mitochondria, nucleus
7. A pregnant female delivers a baby who suffers from stunted growth, mental retardation, low intelligence quotient and abnormal skin. This may be because of
 - a. low secretion of growth hormone
 - b. cancer of thyroid gland
 - c. over secretion of pars distalis
 - d. deficiency of iodine in diet.
8. In resting state, sodium-potassium pump transports
 - a. three sodium ions outside for two potassium ions into the cell
 - b. two sodium ions outside for three potassium ions into the cell
 - c. three sodium ions outside for three potassium ions into the cell
 - d. two sodium ions outside for two potassium ions into the cell
9. During non-cyclic photophosphorylation water acts as a/an
 - a. reducing agent
 - b. oxidizing agent
 - c. phosphorylating agent
 - d. stabilising agent
10. Which of the following combinations of hormones binds with intracellular receptors?
 - a. Insulin, FSH, Cortisol
 - b. Glucagon, Testosterone, FSH
 - c. Thyroxine, Testosterone, Estradiol
 - d. Insulin, Androgen, PTH

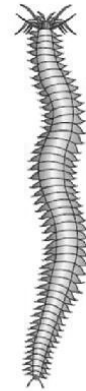
11. Given below are the figures of a few organisms. Find the correct option with respect to their excretory organs.



A



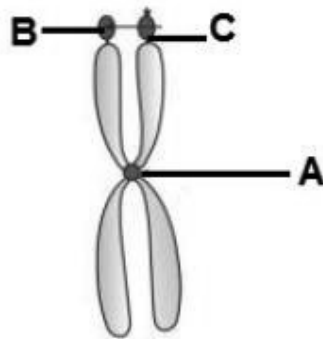
B



C

- a. A- Malpighian tubules, B- flame cells, C- nephridia
- b. A – green gland, B - nephron, C- nephridia
- c. A – Malpighian tubules, B- nephridia, C- flame cells
- d. A – flame cells, B – nephridia, C – nephron

12. What does A, B and C represent in the given figure?



A

B

C

- a. Centriole Telomere Primary constriction
- b. Centriole Satellite Secondary constriction
- c. Centromere Satellite Secondary constriction
- d. Centromere Telomere Primary constriction

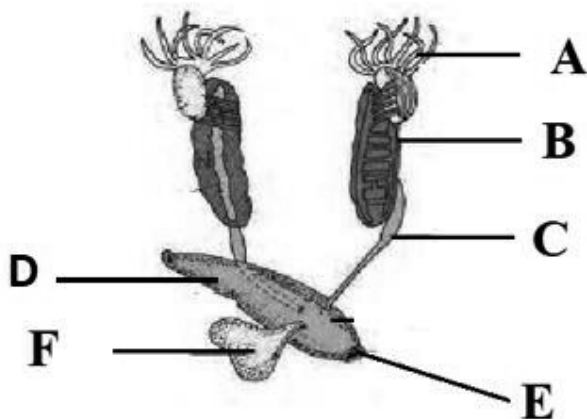
Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- A. Both A and R are true and R is the correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A.
- C. A is true but R is false.
- D. A is false but R is true.

- 13. Assertion: Mitochondria of active cell has more number of cristae and F_0-F_1 particles.
Reason: F_0-F_1 particles are involved in ATP production.
- 14. Assertion: The axon terminals contain neurotransmitter filled vesicles.
Reason: These neurotransmitters can help in the transmission of impulse in any direction.
- 15. Assertion: Pruning enhances growth of lateral branches.
Reason: Pruning promotes ethylene production.
- 16. Assertion: Viruses are obligate parasites.
Reason: They are inert outside their specific host cells.

SECTION B

17. Based on the clues given below, identify and name the organ marked in the given figure



- a. Common duct for urine and sperm.
 - b. Common opening for egestion and excretion.
 - c. Organ which stores urine temporarily.
 - d. Organ which stores undigested food.
18. Which biomolecules are responsible for providing fluidity to plasma membrane. Write the significance of this feature in an organism.

OR

Name the non-membrane bound organelle found in both prokaryotic and eukaryotic cells. Differentiate between the two.

- 19. A student visited a zoological park and saw panthera Tigris printed on a placard outside the tiger enclosure. As a biology student identify the errors he observed in this name. Who proposed this naming system?
- 20. a) The partial pressure of oxygen in the atmospheric air drops in bronchioles even before exchange begins in alveoli. Justify.

b) Diksha was practicing breathing exercises (*Pranayam*). She exhaled forcibly and then inhaled the maximum amount of air she could. Which pulmonary capacity is being measured. Calculate the volume of air she could inhale.

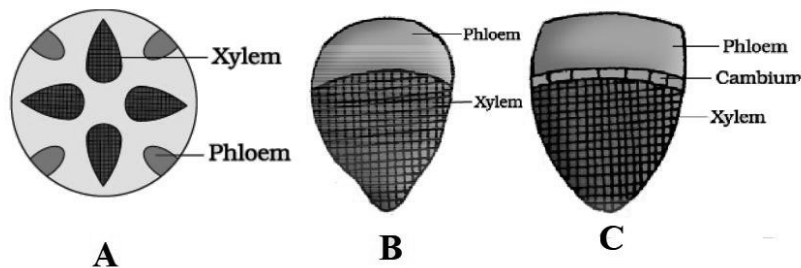
21. Neha observed the growth pattern in a stem of plant and recorded her observations as

	Day 1	Day 2	Day 3	Day 4	Day 5
Stem length (in cm)	4	6	8	10	12

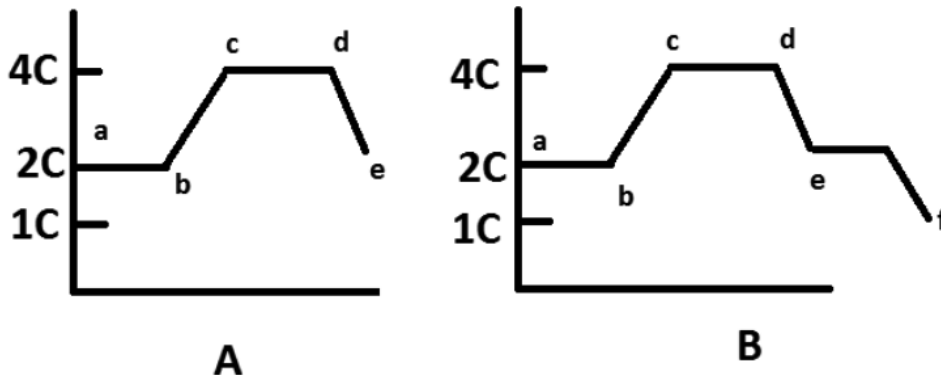
- Identify the type of growth pattern observed.
- Write its mathematical expression.

SECTION C

22. In the following figures showing vascular bundles

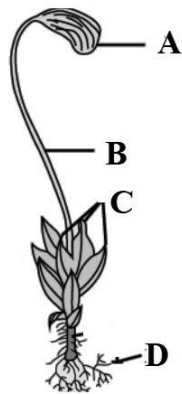


- Identify the type A, B and C.
 - Name the type of the plant and the plant part in which the above are found.
23. Compare any three classes of Kingdom Fungi on the basis of their mycelium and mode of asexual reproduction.
24. Study the graphs shown below for DNA content in a normally dividing cell till the division is completed. Answer the following questions.



- Identify the type of cell division depicted in A and B.
 - Which line segment represents the S phase. Justify.
25. To prepare respiratory balance sheet of glucose oxidation, it is assumed that no intermediate compound enters or exits the pathway. During certain circumstances, a glycerol molecule enters as DHAP. Calculate the gross ATP molecules produced by DHAP molecule.

26. In the plant figure shown below



- a. Label the parts B, C and mention their ploidy.
 - b. State the functions of parts A and D.
27. Explain the mechanism of sliding filament theory.

OR

Describe the major structural forms of joints in human body

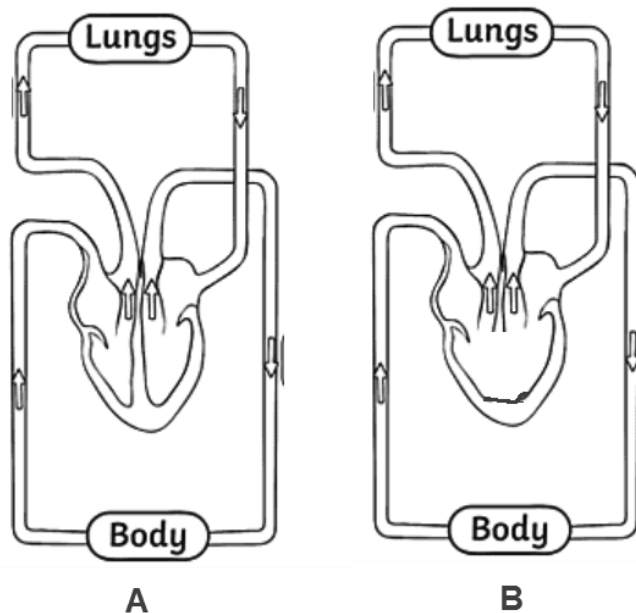
28. Give reasons

- a. *Scoliodon* needs to swim constantly.
- b. Birds have pneumatic bones.
- c. *Platypus*, though oviparous, is a mammal.

SECTION D

Q.no 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.

29. Observe the diagram and answer the questions that follow.

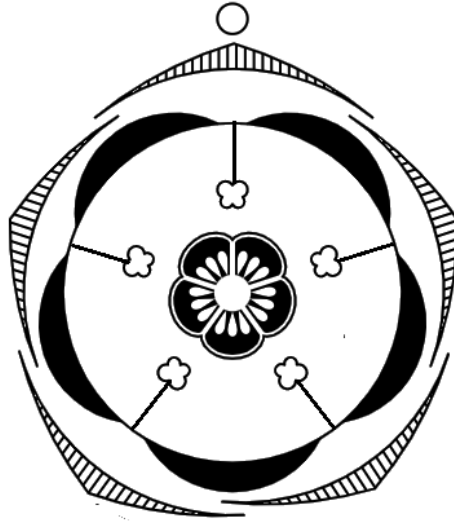


- Name the structure which is present in A but absent in B.
- Which group of organisms has type A and which group has type B type of circulation?
- What could be the possible disadvantage of type B circulation?

OR

Prepare a flow chart representing the type of circulation shown in type A.

30. Given below is a floral diagram.



- Identify the aestivation shown in the calyx and corolla of the above flower.
- Name the type of placentation seen in its ovary. Give example of a flower showing such placentation.
- Write the floral formula of the given flower.

OR

Enlist four characteristics of its androecium.

SECTION E

31. Diagrammatically represent the Hatch and Slack Pathway.

OR

Diagrammatically represent the chemiosmotic hypothesis of chloroplast.

32. a) Give the polarity of x and x' in the line diagram of DNA double helix given below.

b) If a DNA fragment has 800 bp in it, calculate the length of DNA in Angstrom.

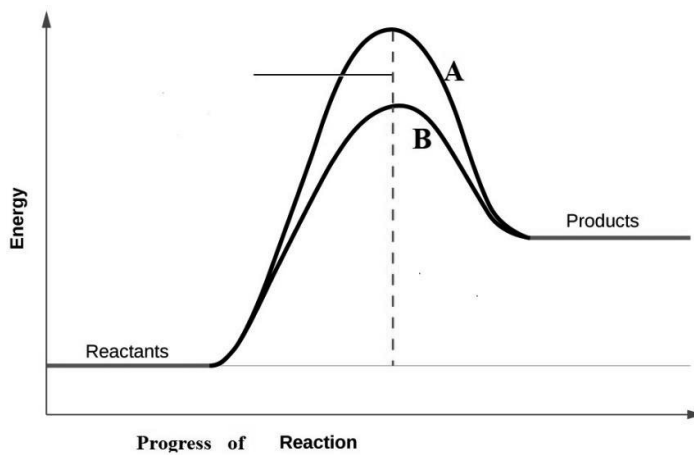
c) If a DNA fragment of 1000 bp has 400 Adenine nitrogen bases, calculate the amount of Guanine, Thymine and Cytosine in it.

d) Give one structural difference in the building block of DNA and RNA.



OR

Observe the given graph showing a chemical reaction taking place in the presence and absence of an enzyme.



- Based on energy level difference between substrate/reactant and product, identify the type of reaction.
- Which of the two curves depicts the reaction catalysed by enzyme? Give reason.
- If a chemical closely resembling the substrate is added to the reaction, which of the curves in the graph will be affected and why?

33. Kidneys of mammals have special arrangement for conserving water.

- Discuss the structural arrangement which facilitates this water conservation.
- Explain the mechanism that helps in the production of concentrated urine.

OR

Kidneys have built-in mechanism for regulation of their function.

- Explain the regulatory apparatus present in kidney.
- With the help of flow chart explain its regulatory mechanism.

BIOLOGY (044) CLASS XI SAMPLE PAPER

Marking Scheme

(Marking scheme and Hints to solution)

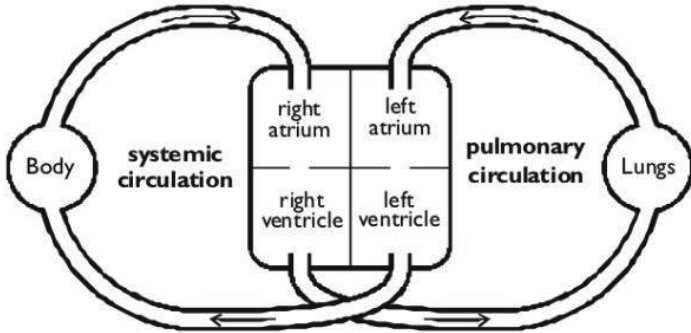

Note: (Any other relevant answer not given here in but given by the candidate be also suitably awarded)

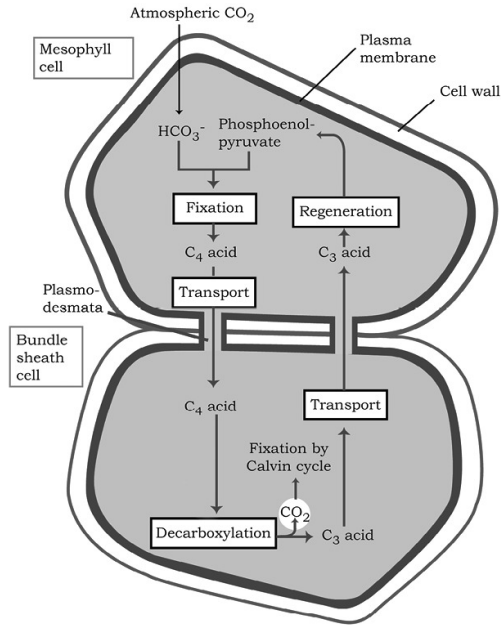
Q.No.	Value Points / Key points	Marks allotted to each value point/key point	Total marks
1	b. Pneumatophores	1	1
2	b. A-iii, B-ii, C-i	1	1
3	c. I-i, II-iv, III-ii, IV-v, V-iii	1	1
4	c. Heart cells	1	1
5	d. ii and iv	1	1
6	c. bacteria, mitochondria, chloroplast	1	1
7	d. deficiency of iodine in diet	1	1
8	a. three sodium ions outside for two potassium ions into the cell	1	1
9	a. reducing agent	1	1
10	c. Thyroxine, Testosterone, Estradiol	1	1
11	a. A- Malpighian tubules, B- flame cells, C- nephridia	1	1
12	c. Centromere, Satellite, Secondary constriction	1	1

13	A. Both A and R are true and R is the correct explanation of A	1	1
14	C . A is true but R is false.	1	1
15	C . A is true but R is false.	1	1
16	A Both A and R are true and R is the correct explanation of A.	1	1
17	<p>a. C - urinogenital duct</p> <p>b. E - cloacal aperture</p> <p>c. F- urinary bladder</p> <p>d. D – rectum</p>	$\frac{1}{2} \times 4$	2
18	<p>Lipids</p> <p>It helps in functions like cell growth, formation of intercellular junctions, secretion, endocytosis, cell division (any three)</p> <p>OR</p> <p>Ribosome</p> <p>In prokaryotes 70S</p> <p>In eukaryotes 80S</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2} \times 3$</p> <p>1</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>	<p>2</p> <p>2</p>
19	<p>Errors -</p> <ul style="list-style-type: none"> ● Generic name must starts with capital letter ● Specific epithet starts with small letter ● Print in italics <p>Proposed by - Carolus Linnaeus</p>	<p>$\frac{1}{2} \times 3$</p> <p>$\frac{1}{2}$</p>	<p>2</p> <p>2</p>

20	<p>a) Due to presence of residual volume b) Vital capacity,</p> <p>IRV+TV+ERV = 4000 ml -4600 ml</p>	$\frac{1}{2}$ $\frac{1}{2}$ 1	2																
21	<p>a) arithmetic growth b) $L_t = L_0 + rt$ L_t = length at time 't' L_0 = length at time 'zero' r = growth rate / elongation per unit time.</p>	$\frac{1}{2}$ $\frac{1}{2} \times 3$	2																
22	<ul style="list-style-type: none"> • A is radial vascular bundle, present in roots. • B is conjoint closed vascular bundle, present in monocot stem. • C is conjoint open vascular bundle, present in dicot stem. 	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	3																
23	<p><u>Phycomycetes</u> Aseptate and coenocytic mycelium, aplanospores and zoospores.</p> <p><u>Ascomycetes</u> Septate and branched mycelium, conidia.</p> <p><u>Basidiomycetes</u> Septate and branched mycelium, asexual spores absent.</p> <p><u>Deuteromycetes</u> Septate and branched mycelium, conidia.</p> <p>(Any three classes)</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	3																
24	<ul style="list-style-type: none"> • A is mitosis. • B is meiosis • Line segment "bc" represents S phase because during this phase DNA replication takes place and the amount of DNA per cell doubles, i.e if the initial amount of DNA is 2C then it will increase to 4C. 	$\frac{1}{2}$ $\frac{1}{2}$ 1+1	3																
25	<table border="1" data-bbox="363 1675 1084 1896"> <thead> <tr> <th></th> <th>Glycolysis</th> <th>Oxidative decarboxylation</th> <th>Kreb's cycle</th> </tr> </thead> <tbody> <tr> <td>ATP</td> <td>2</td> <td>-</td> <td>1</td> </tr> <tr> <td>NADH</td> <td>1</td> <td>1</td> <td>3</td> </tr> <tr> <td>FADH</td> <td>-</td> <td>-</td> <td>1</td> </tr> </tbody> </table>		Glycolysis	Oxidative decarboxylation	Kreb's cycle	ATP	2	-	1	NADH	1	1	3	FADH	-	-	1	2	
	Glycolysis	Oxidative decarboxylation	Kreb's cycle																
ATP	2	-	1																
NADH	1	1	3																
FADH	-	-	1																

	<p>1 NADH = 3 ATP</p> <p>1 FADH = 2 ATP</p> <p>Total ATP = 3 + 15 + 2 = 20.</p>	1	3
26	<p>a. B is seta and it is diploid.</p> <p>C are leaves and they are haploid.</p> <p>b. A is capsule and produce spores.</p> <p>D is rhizoids which attach the plant body to the substratum.</p>	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>	3
27	<p>Sliding filament theory</p> <ul style="list-style-type: none"> • A neural signal reaching neuromuscular junction releases acetylcholine that generates action potential in the sarcolemma. • This causes release of calcium ions in the sarcoplasm. • This leads to binding of calcium with a subunit of troponin on actin filaments and remove the masking of active sites for myosin. • Using the energy of ATP, myosin heads bind to exposed active sites on actin to form a cross bridge. • This pulls the actin filaments towards the centre of A band. • The Z lines are also pulled inwards causing shortening of the sarcomere. <p>OR</p> <p>Three types of joints are:</p> <ul style="list-style-type: none"> • Fibrous joints - do not allow any movement. It is shown by flat skull bones. • Cartilaginous joints - the bones involved are joined together with the help of cartilages. • Synovial joints - characterised by the presence of a fluid filled synovial cavity between the articulating surfaces of the two bones. 	$\frac{1}{2} \times 6$	1 x 3
28	<p>a) Scoliodon lacks air bladder and has to swim constantly to avoid sinking.</p> <p>b) Birds have pneumatic bones that have air cavities to aid in flying.</p>	1	1

	c) Platypus, though oviparous, it has mammary glands.	1	3
29	<p>a. intraventricular septum</p> <p>b. aves/mammals // amphibians/reptiles</p> <p>c. mixing of oxygenated and deoxygenated blood.</p> <p>Less efficient</p> <p>OR</p> 	<p>1</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>1+1</p> <p>1+1</p>	4
30	<p>a. imbricate, valvate</p> <p>b. axile, china rose</p> <p>c.</p>  <p>OR</p> <p>Five, polyandrous, epipetalous, bilobed</p>	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>2</p> <p>$\frac{1}{2} \times 4$</p>	4
31.	Fig. 13.9, Pg No.219, NCERT Textbook XI		

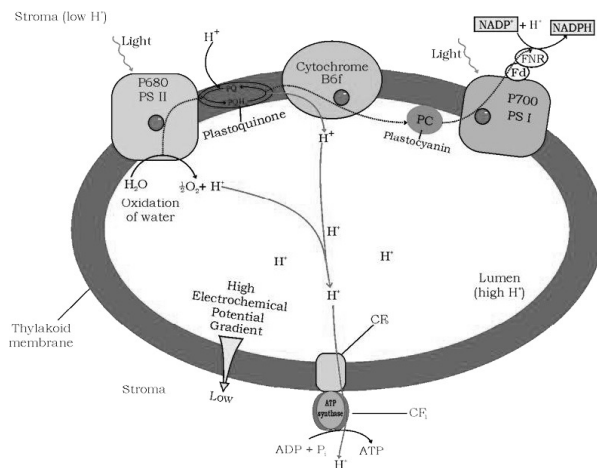


Key features of diagram

- Name of cells – mesophyll and bundle sheath
- Fixation
- Transportation
- Decarboxylation
- Regeneration

OR

Fig 13.7, Pg No. 214, NCERT textbook XI



Key features of diagram

1 x 5

	<ul style="list-style-type: none"> • PS II • Cyt bf6 • PSI • ATPase • Proton gradient 	1 x 5	5
32	<p>a) x-3', x'-5'</p> <p>b) Distance between 2 bp= 3.4Å Total length = 800 X 3.4 = 2720Å</p> <p>c) Total number of bps = 1000 Total no. of bases= 1000 x 2 = 2000</p> <p>No. of T= No. of A(given) = 400 Total no of T and A = 400 +400 = 800 Total No of C and G = 2000 -800 = 1200 No. of C = No of G = 1200/2 = 600</p> <p>d) DNA has deoxyribose sugar RNA has ribose sugar (or any other relevant answer)</p> <p style="text-align: center;">OR</p> <p>a) Endothermic reaction, as energy level of Product is higher than substrate/ reactant.</p> <p>b) Curve B represents enzyme catalysed reaction/ Since difference in average energy content of reactant from that of transition state (Activation energy) is lower than in curve A.</p> <p>c) Curve B Chemical will act as competitive inhibitor/will bind to active site of enzyme/will affect conversion of substrate to product</p>	<p>½ + ½</p> <p>½ + ½</p> <p>2</p> <p>½ + ½</p> <p>1</p> <p>2</p> <p>2</p>	5
33	<ul style="list-style-type: none"> • The Henle's loop and vasa recta play a significant role in concentrating urine. • The flow of filtrate in the two limbs of Henle's loop is in opposite directions and thus forms a counter current. • The flow of blood through the two limbs of vasa recta is also in a counter current pattern. • The proximity between the Henle's loop and vasa recta, as well as the counter current in them help in maintaining 		

	<p>an increasing osmolarity towards the inner medullary interstitium,</p> <ul style="list-style-type: none"> • Osmolarity gradient from 300 mOsmolL⁻¹ in the cortex to about 1200 mOsmolL⁻¹ in the inner medulla. This gradient is mainly caused by NaCl and urea. • NaCl is transported by the ascending limb of Henle's loop which is exchanged with the descending limb of vasa recta. • NaCl is returned to the interstitium by the ascending portion of vasa recta. • Similarly, small amounts of urea enter the thin segment of the ascending limb of Henle's loop which is transported back to the interstitium by the collecting tubule. • This counter current mechanism helps to maintain a concentration gradient in the medullary interstitium. • Presence of such interstitial gradient helps in an easy passage of water from the collecting tubule thereby concentrating the filtrate (urine). <p>OR</p> <ul style="list-style-type: none"> • JGA • JGA location • RAAS mechanism 	<p>$\frac{1}{2} \times 10$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>4</p>	<p>5</p> <p>5</p>
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