Contents

CHECKLIST

BIOLOGY CHECKLIST

Chapter Name	Theory	ShortNotes	PYQ	Revision1	Revision2
The Living World					
Biological Classification					
Plant Kingdom					
Animal Kingdom					
Morphology of Flowering Plants					
Anatomy of Flowering Plants					
Structural Organisation in Animals					
Cell: The Unit of Life					
Biomolecules					
Cell Cycle and Cell Division					
Photosynthesis in Higher Plants					
Respiration in Plants					
Plant Growth and Development					
Breathing and Exchange of Gases					
Body Fluids and Circulation					
Excretory Products and Their Elimination					
Locomotion and Movement					
Neural Control and Coordination					
Chemical Coordination and Integration					
Sexual Reproduction in Flowering Plants					
Human Reproduction					
Reproductive Health					
Principles of Inheritance and Variation					
Molecular Basis of Inheritance					
Evolution					
Human Health and Disease					
Microbes in Human Welfare					
Biotechnology: Principles and Processes					
Biotechnology and its Applications					
Organisms and Populations					
Ecosystem					
Biodiversity and Conservation					

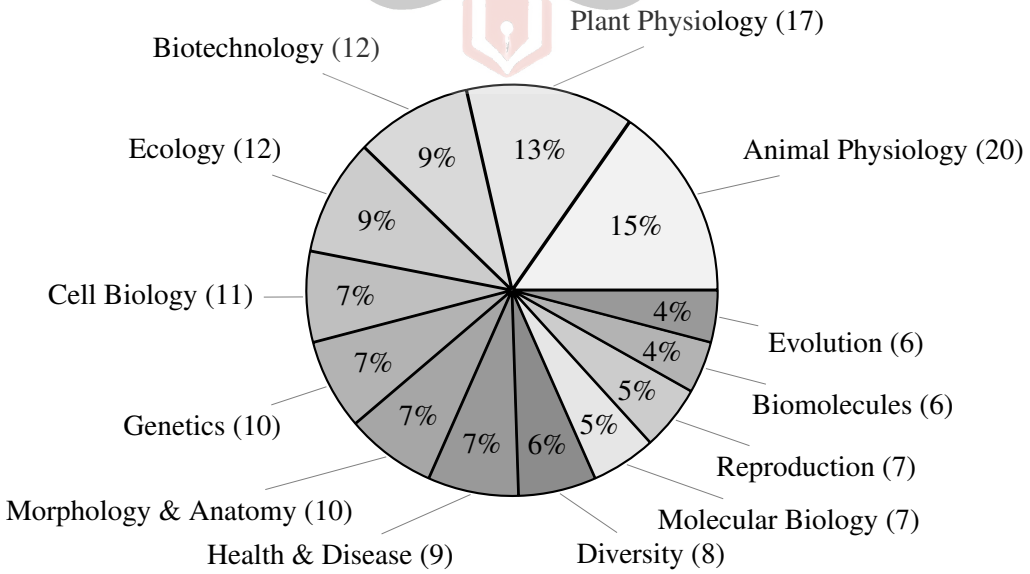
TREND ANALYSIS

BIOLOGY

Table 5: Chapter-wise Question Distribution Matrix

Chapter	17	18	19	20	21	22	23	24	25	Average
Animal Physiology	1	4	2	3	1	3	1	3	2	**2.2**
Plant Physiology	2	-	1	2	3	2	1	2	4	**1.8**
Biotechnology	1	2	1	1	2	1	1	2	1	**1.3**
Ecology	1	2	1	2	2	1	1	1	1	**1.3**
Morphology & Anatomy	1	-	2	1	2	1	2	1	-	**1.1**
Health & Disease	2	2	1	1	1	-	1	1	-	**1.0**
Cell Biology	2	2	1	1	1	1	1	-	2	**1.2**
Genetics	1	1	1	-	-	3	1	1	2	**1.1**
Molecular Biology	-	1	1	1	1	1	1	1	-	**0.7**
Reproduction	1	-	1	1	-	-	2	2	-	**0.7**
Diversity	1	1	1	1	1	1	-	1	1	**1.0**
Evolution	1	-	1	1	1	1	1	-	-	**0.6**
Biomolecules	1	-	1	-	-	-	2	-	2	**0.6**

Figure 1: Chapter-wise Distribution of Biology Questions (2017-2025)



IISER Admission Trends Projections (2024-2026)

Table 13: IAT 2024 Final Closing Ranks (Category-wise)

Programme	GEN	OBC-NCL	SC	ST	EWS
IISER Berhampur BS–MS	4484	2407	965	475	782
IISER Bhopal BS–MS	3136	1712	707	349	526
IISER Kolkata BS–MS	1987	1377	502	276	380
IISER Mohali BS–MS	3034	1781	679	333	473
IISER Pune BS–MS	1023	938	340	222	247
IISER TVM BS–MS	3447	1634	858	417	625
IISER Tirupati BS–MS	4325	2318	953	483	782
IISER Bhopal B.Tech.	2141	944	624	144	207
IISER Bhopal BS Econ. Sci.	2837	1017	700	347	306

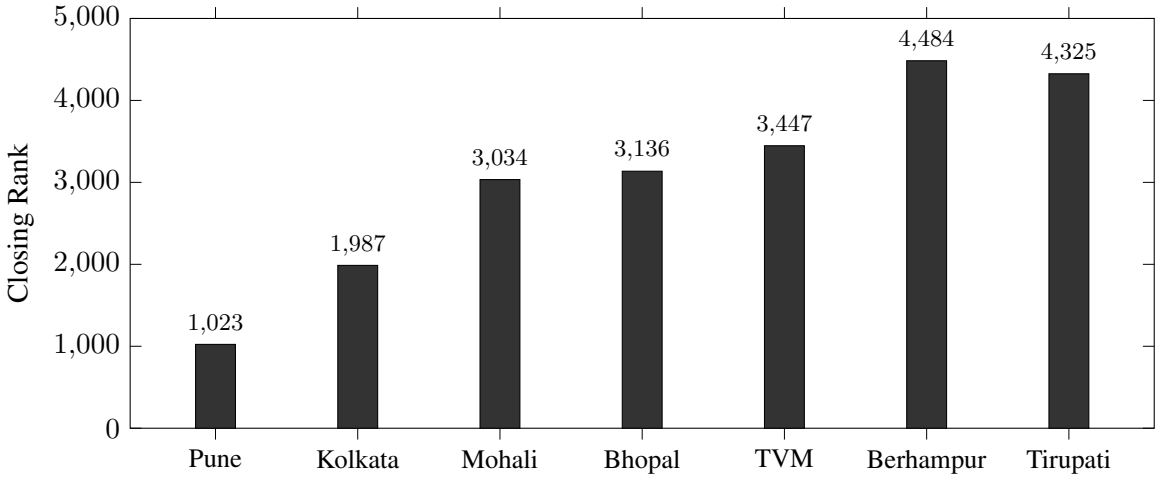
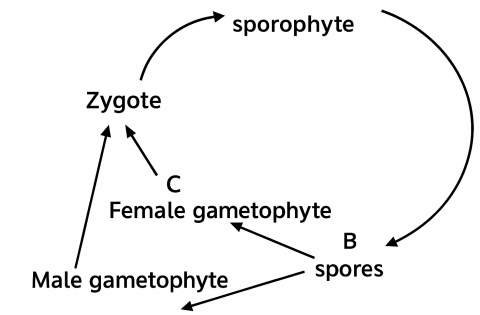


Figure 5: 2024 General Category Closing Ranks

BIOLOGY

1. The generalized life cycle of a moss is shown. The ploidy levels at stages A (sporophyte), B and C respectively are



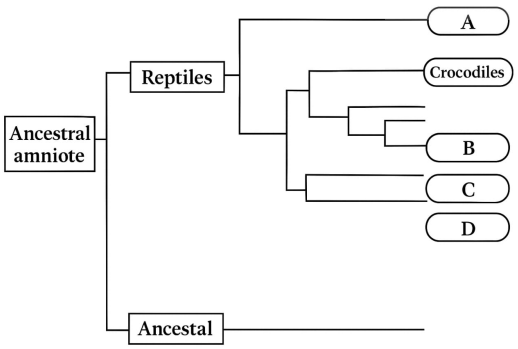
a. 2n, 2n and n

b. n, n and n

c. 2n, n and n

d. 2n, n and 3n

2. The phylogenetic tree of amniote vertebrates is given in the following diagram. The groups labeled A, B, C, D are:



a. A-Snakes, B-Turtles, C-Birds, D-Mammals

b. A-Snakes, B-Turtles, C-Mammals, D-Birds

c. A-Turtles, B-Birds, C-Snakes, D-Mammals

d. A-Birds, B-Turtles, C-Snakes, D-Mammals

3. Match the following and choose the correct combination.

A.	Endodermis	1.	Companion cells
B.	Stomata	2.	Lenticels
C.	Sieve tube	3.	Palisade cells
D.	Periderm	4.	Passage cells
E.	Mesophyll	5.	Accessory cells

a. A-4,B-5,C-2,D-1,E-3

b. A-5,B-3,C-1,D-2,E-4

c. A-4,B-5,C-1,D-2,E-3

d. A-2,B-5,C-3,D-4,E-1

4. If the arabidopsis cell is undergone fractionation, then arrange the organelle in the order of their extraction.

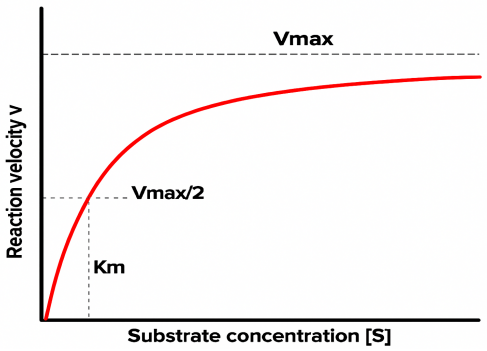
a. Nuclei, Mitochondria, Lysosomes, Endoplasmic reticulum, Ribosomes, Centriole

b. Ribosomes, Endoplasmic reticulum, Lysosomes, Mitochondria, Nuclei, Centriole

c. Ribosomes, Lysosomes, Endoplasmic reticulum, Mitochondria, Nuclei, Centriole

d. Nuclei, Chloroplast, Mitochondria, Lysosomes, Endoplasmic reticulum, Ribosomes

5. Given below is the graph showing the effect of substrate concentration on enzyme activity. In the presence of competitive inhibitor, when the concentration of the substrate is progressively increased.



a. The K_m value is increased but the reaction will not achieve V_{max}

SOLUTIONS

Solution 1: In mosses, the dominant phase of the life cycle is the haploid gametophyte.

The sporophyte develops after fertilization and remains attached to and nutritionally dependent on the gametophyte.

- Stage A represents the sporophyte and is diploid (2n).
- Stages B and C represent gametophytic structures and are haploid (n).

Thus, the ploidy sequence is:

$$2n, n, n$$

Correct option: (C)

Solution 2: From the given phylogenetic tree of amniotes:

- Birds and reptiles share a closer evolutionary relationship than reptiles and mammals.
- Mammals branch separately from the reptilian lineage.
- Turtles diverge early from other reptiles.

Thus, the correct identification is:

$$A = \text{Birds},\ B = \text{Turtles},\ C = \text{Snakes},$$

$$D = \text{Mammals}$$

Correct option: (D)

Solution 3: Correct matching of plant structures:

- Endodermis $\rightarrow$ Passage cells
- Stomata $\rightarrow$ Accessory cells
- Sieve tube $\rightarrow$ Companion cells
- Periderm $\rightarrow$ Lenticels
- Mesophyll $\rightarrow$ Palisade cells

Thus:

$$A-4,\ B-5,\ C-1,\ D-2,\ E-3$$

Correct option: (C)

Solution 4: In cell fractionation, organelles are separated based on size and density.

Heaviest organelles sediment first, followed by lighter ones.

Correct order:

Nuclei $\rightarrow$ Chloroplast $\rightarrow$ Mitochondria $\rightarrow$ Lysosomes

$\rightarrow$ ER $\rightarrow$ Ribosomes

Correct option: (D)

Solution 5: In competitive inhibition:

- Substrate and inhibitor compete for the active site.
- Increasing substrate concentration overcomes inhibition.
- Apparent K_m increases.
- V_{max} remains unchanged.

Correct option: (B)

Solution 6: The diagram represents linear (non-cyclic) photophosphorylation.

Evaluation:

- PSII primary acceptor is pheophytin, but $NADP^+$ reductase is not an acceptor.

AIITS 4

Syllabus – Full Syllabus **Total Marks – 240**

Name: _____ **Date:** _____

Instructions:

- Each MCQ has 4 options, with only one correct answer.
- The paper consists of 60 questions.
- Each subject consists of 15 questions.
- **Duration:** 180 minutes
- **Marking Scheme:**
  - Correct: +4 marks
  - Incorrect: -1 mark
  - Unattempted: No marks
- **Maximum Marks:** 240
- **Best of luck for your exam!**

BIOLOGY

1. Which of the following hormones is correctly matched with its source and function?

a. Oxytocin – Posterior pituitary – Stimulates follicle maturation

b. Vasopressin – Posterior pituitary – Increases water reabsorption

c. LH – Anterior pituitary – Inhibits ovulation

d. ACTH – Adrenal medulla – Stimulates adrenal cortex

2. Which of the following is correct with respect to the effect of the enzyme on the equilibrium position?

a. Enzyme lowers the reaction's activation energy by changing the reaction's equilibrium position

b. Enzyme lowers the activation energy of the reaction by increasing molecular collisions

c. The enzyme cannot change the equilibrium position of the reaction but lowers the free energy difference between substrate and product

d. Enzymes, for sure lower the activation energy of the reaction but cannot alter the equilibrium position

3. You are given a 3D protein structure. Which of the following amino acid is likely to be the center of the 3D structure?

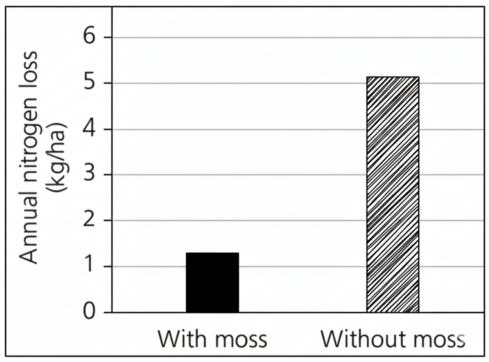
a. Isoleucine

b. Serine

c. Aspartate

d. Lysine

4. You are tasked to measure nitrogen losses in a sandy soil ecosystem dominated by moss and soil from which moss was removed two months before the measurement. And you got the below result. What would you conclude from the following result?



a. Mosses reduce nitrogen retention in the soil

b. Mosses structurally change the molecular properties of soil

c. Mosses reduce the loss of nitrogen from the soil

d. The analyzed result is not plausible

5. Understanding the origin of viruses has been a debated topic for a long time. Although few hypotheses are proposed. Select the correct statement with respect to the origin of the virus

a. Origin of viruses is unclear because the fossils formed by the virus are easily perishable and difficult to store.

b. Viruses are once small parasitic cell that now has lost all genes responsible for their independent survival in the outer environment.This is what the regressive hypothesis says

c. Cellular origin hypothesis says that viruses are evolved independently in an environment where different proteins and nucleic acids combine to form complex molecules.

d. Coevolution hypothesis says that some viruses may have evolved from bits of DNA or RNA that "escaped" from the genes of a larger organism.

6. 'P' and 'Q' are the two separate molecules which have the same molecular structure with 4 pyrrole rings in them except the central element. Also, the

BIOLOGY

1. What will be the sequence of RNA synthesized using the following DNA template strand?

5'-GTCTAGGCTTCTC-3'

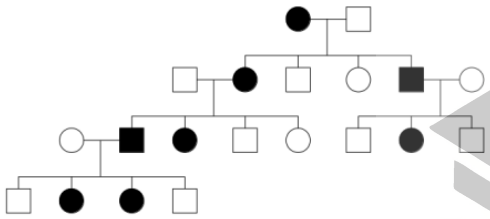
a. 5'-GUCUAGGCUUCUC-3'

b. 5'-CAGAUCCGAAGAG-3'

c. 5'-CUCUUCGGAUCUG-3'

d. 5'-GAGAAGCCUAGAC-3'

2. The following pedigree diagram shows the inheritance of a rare genetic disorder (filled shapes depict affected individuals.



Which of the following is the most likely pattern of inheritance of the disorder?

a. X-linked recessive

b. Autosomal recessive

c. Autosomal dominant

d. X-linked dominant

3. Match the list of conditions (Column I) with the list of affected physiological processes (Column II).

Column I		Column II	
P	Allergy	i	Excess secretion of growth hormone
Q	Uremia	ii	Exaggerated immune response to environmental substances
R	Myasthenia gravis	iii	Autoimmune disorder affecting the neuromuscular junction
S	Acromegaly	iv	Malfunctioning of kidneys which can lead to urea accumulation in the blood

Which of the following combinations is correct?

a. P - (ii); Q - (iv); R - (iii); S - (i)

b. P - (iii); Q - (iv); R - (i); S - (ii)

c. P - (iv); Q - (iii); R - (i); S - (ii)

d. P - (ii); Q - (i); R - (iv); S - (iii)

4. Which of the following proteins plays a direct role in muscle contraction?

a. Trypsin

b. Troponin

c. Insulin

d. Myoglobin

5. Which of the following is NOT derived from the epidermal cell layer in plants?

a. Casparian strip from rice root

b. Trichomes from maize leaf

c. Subsidiary cells from rice leaf

d. Bulliform cells from grass

6. Which of the following statements about meiosis in sexually reproducing plants is INCORRECT?

a. The end products of meiosis II are haploid gametes.

b. The four products of meiosis are genetically different.

c. Meiotic recombination takes place in both males and females.

d. In most flowering plants, only one of the four products of meiosis survives in females.

7. The following graph options show the relationship between light intensity and photosynthesis rate. Which graph correctly represents this relationship?

SOLUTIONS

Solution 1:

P → **iv (Chordata)**: Characterized by the presence of a **notochord** and **hollow dorsal nerve cord**.

Q → **i (Cyclostomata)**: **Jawless** ectoparasites with **6-15 pairs of gills** and **closed circulatory system**.

R → **ii (Chondrichthyes)**: Marine animals with **persistent notochord** and **placoid scales** (e.g., sharks).

S → **iii (Hemichordata)**: Organisms with **open circulatory system** and **stomochord** (e.g., Balanoglossus).

Solution 2: Chromosomes are classified as **metacentric**, **sub-metacentric**, **acrocentric**, and **telocentric** based on the position of the **centromere**, which divides the chromosome into two arms:

- **Metacentric**: Centromere is in the **middle**, both arms are equal.
- **Sub-metacentric**: Centromere is **slightly off-center**, one arm is longer.
- **Acrocentric**: Centromere is **close to one end**, creating a very short and a very long arm.
- **Telocentric**: Centromere is at the **terminal end**, effectively having only one visible arm.

Solution 3: A **triglyceride** is a type of **lipid** formed by the **esterification** of **three fatty acid molecules** with **one glycerol molecule**. This structure is the main form of fat stored in the body and found in the diet.

- **Glycerol** has **three hydroxyl (-OH) groups**.
- Each **fatty acid** has a **carboxyl (-COOH) group**.
- An **ester bond** forms between the **hydroxyl group** of glycerol and the **carboxyl group** of each fatty acid.

Solution 4: **Carotenoids** are a group of **plant pigments** found in **chloroplasts** and **chromoplasts**, responsible for **red, orange, and yellow colors** in many fruits and vegetables. They play multiple roles in plants:

Carotenoids are **accessory pigments** that:

- **Absorb blue to blue-green light (400–500 nm)**.
- **Protect chlorophyll-a** from **photo-oxidation**.
- Serve as **precursors** for the plant stress hormone **abscisic acid (ABA)**.
- **Accumulate in chromoplasts** during fruit ripening.

Option (b) is **false** because carotenoids **do not absorb light in the 600–700 nm range**; that region is absorbed by chlorophylls, not carotenoids.

Solution 5:

Exp	Chem	Site	Effect	ATP
1	X	C-I → UQ	NADH blocked; $FADH_2$ (C-II) works	↓
2	Y	C-III → Cyt c	Both NADH & $FADH_2$ blocked	↓↓
3	–	–	Normal flow & gradient	↑

ATP: $2 < 1 < 3$

PYP MOCK TEST 1

Syllabus – FULL SYLLABUS **Total Marks – 240**

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BIOLOGY

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b. P - (iii); Q - (iv); R - (i); S - (ii)

c. P - (iv); Q - (iii); R - (i); S - (ii)

d. P - (ii); Q - (i); R - (iv); S - (iii)

2. Match the enzymes in Column I with the cellular compartments in Column II.

Column I		Column II	
P	Succinate dehydrogenase	i	Cytoplasm
Q	Pyruvate dehydrogenase	ii	Inner mitochondrial membrane
R	Lactate dehydrogenase	iii	Mitochondrial matrix
S	ATP synthase	iv	Thylakoid membrane
		v	Inner chloroplast membrane

Which of the following combinations is correct?

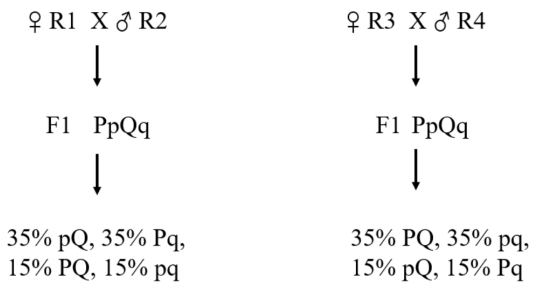
a. P - (ii); Q - (iii); R - (i); S - (iv)

b. P - (iv); Q - (i); R - (iii); S - (ii)

c. P - (iii); Q - (ii); R - (i); S - (v)

d. P - (iii); Q - (i); R - (iv); S - (ii)

3. Two double heterozygous plants (PpQq), derived from two different pairs of true-breeding parents of unknown genotype, produce gametes in the proportions as given below.



Which one of the following options correctly represents the genotype of the parents?

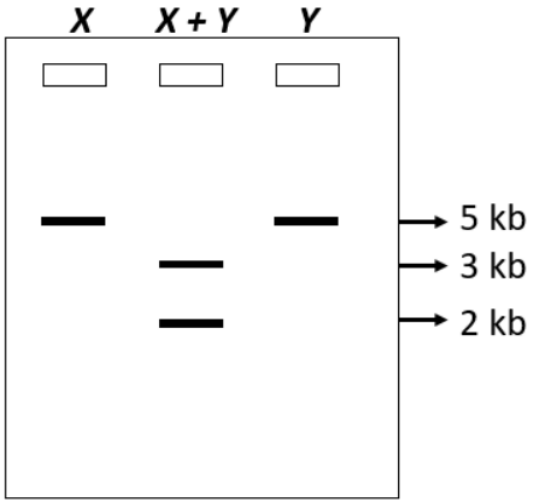
a. R1 = PPQQ; R2 = ppqq; R3 = ppQQ; R4 = PPqq

b. R1 = ppQQ; R2 = PPqq; R3 = PPqq; R4 = ppQQ

c. R1 = ppQQ; R2 = PPqq; R3 = PPQQ; R4 = ppqq

d. R1 = PPQQ; R2 = ppqq; R3 = ppqq; R4 = PPQQ

4. The given picture was obtained from an agarose gel electrophoresis of a plasmid after digestion with restriction enzymes either X, Y or both X and Y.



Which one of the following diagrams correctly represents the position of the restriction enzyme sites (X, Y) on the 10,000 bp plasmid?