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PAST YEAR PAPERS (2017–2026)

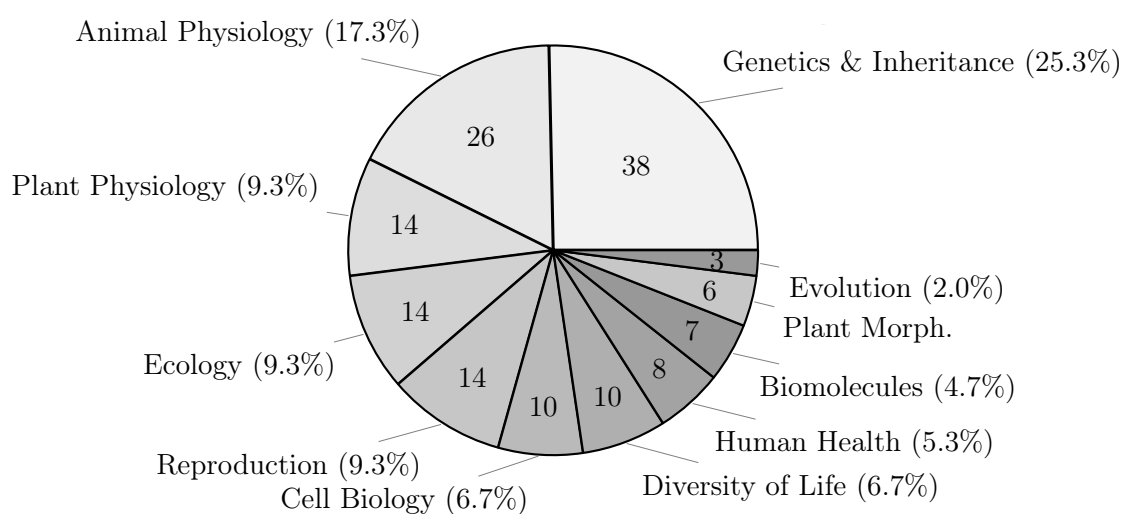
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BIOLOGY

Table 1: *Biology — Chapter-wise Question Distribution (IAT 2017–2026)*

Chapter	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	Total	Wgt%
Principles of Inheritance & Variation	1	1	1	1	0	3	2	1	2	2	14	9.33%
Biotechnology: Principles & Processes	1	2	1	1	1	1	1	2	2	2	14	9.33%
Molecular Basis of Inheritance	0	1	1	1	2	0	1	1	1	2	10	6.67%
Organisms and Populations	1	2	0	2	2	0	0	1	0	1	9	6.00%
Cell Cycle and Cell Division	1	1	0	1	1	1	1	1	1	0	8	5.33%
Human Health and Disease	2	0	1	1	1	0	1	2	0	0	8	5.33%
Photosynthesis in Higher Plants	0	0	1	1	2	0	0	1	1	1	7	4.67%
Biomolecules	1	0	1	1	0	0	2	0	1	1	7	4.67%
Human Reproduction	2	1	0	0	0	0	1	0	1	2	7	4.67%
Sexual Reproduction in Flowering Plants	0	0	2	2	0	2	0	1	0	0	7	4.67%
Excretory Products & Their Elimination	0	1	0	1	1	1	1	0	1	0	6	4.00%
Respiration in Plants	1	0	0	0	1	2	0	1	1	0	6	4.00%
Structural Organisation in Animals	2	0	1	0	1	0	1	0	0	0	5	3.33%
Locomotion and Movement	0	0	1	1	0	0	0	1	1	1	5	3.33%
Animal Kingdom	0	1	0	1	0	1	0	1	1	0	5	3.33%
Biological Classification	0	0	2	0	1	1	0	0	0	1	5	3.33%
Morphology of Flowering Plants	0	0	0	1	1	0	1	1	0	0	4	2.67%
Chemical Coordination & Integration	0	2	0	0	0	0	0	0	0	1	3	2.00%
Breathing and Exchange of Gases	0	1	0	0	0	0	0	1	1	0	3	2.00%
Evolution	1	0	1	0	1	0	0	0	0	0	3	2.00%
Body Fluids and Circulation	0	0	1	0	0	1	0	0	0	0	2	1.33%
Neural Control and Coordination	0	1	0	0	0	1	0	0	0	0	2	1.33%
Ecosystem	0	0	0	0	0	1	0	0	1	0	2	1.33%
Biodiversity and Conservation	0	0	1	0	0	0	1	0	0	0	2	1.33%
Cell: The Unit of Life	1	1	0	0	0	0	0	0	0	0	2	1.33%
Anatomy of Flowering Plants	0	0	0	0	0	0	1	0	0	1	2	1.33%
Transport in Plants	1	0	0	0	0	0	0	0	0	0	1	0.67%
Microbes in Human Welfare	0	0	0	0	0	0	1	0	0	0	1	0.67%
Total	15	15	15	15	15	15	15	15	15	15	150	100%

Grey cells = year with ≥ 3 questions from that chapter. **Total** = cumulative across all 10 IATs. **Wgt%** = Total / 150 $\times$ 100.

Figure: Grouped Topic-wise Share of Biology Questions (IAT 2017–2026)

BIOLOGY

1. Which of the following processes result in development of a proton gradient across the thylakoid membrane during photosynthesis?

- Release of protons into the lumen of the thylakoid by plastoquinone
- Consumption of protons in the stroma during the reduction of NADP^+
- Release of protons into the lumen of the thylakoid by ATP synthase
- Release of protons into the lumen of the thylakoid by water splitting reaction

(a) i, iii and iv

(b) i, ii and iii

(c) i, ii and iv

(d) ii, iii and iv

2. Which one of the following choices matches the organs in column I with their vascular system arrangement described in column II?

Column I		Column II	
P.	Dicot root	i.	Radial, open, diarch to tetrarch
Q.	Dicot stem	ii.	Ring, conjoint, open
R.	Monocot root	iii.	Radial, closed, polyarch
S.	Monocot stem	iv.	Scattered, conjoint, closed

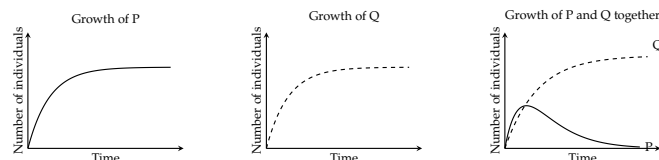
a. P – (ii); Q – (i); R – (iv); S – (iii)

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

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

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

3. The graphs below depict the number of individuals of two organisms, named P and Q, when grown independently, and together. Based on these growth patterns, which one of the following statements is correct?



a. Q is a commensal of P

b. Q is a predator of P

c. P and Q exhibit mutualism

d. P is a parasite of Q

4. The pBR322 cloning vector has genes coding for tetracycline and ampicillin resistance. A foreign DNA to be cloned is inserted into the tetracycline resistance gene and the recombinant plasmid is then transformed into *E. coli* cells. Which one of the following choices is the most likely outcome of this cloning reaction?

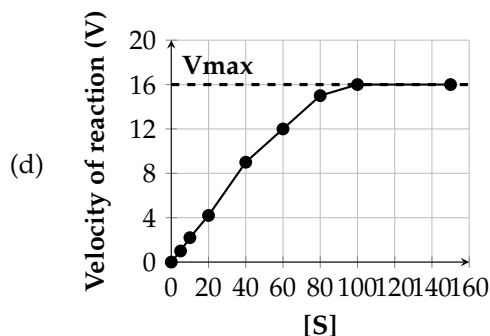
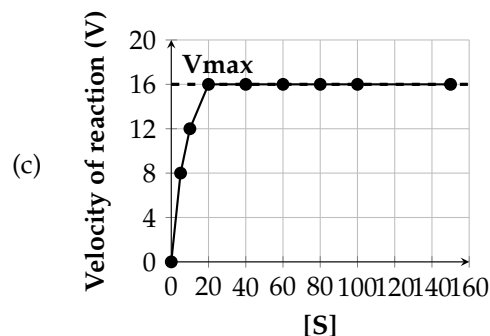
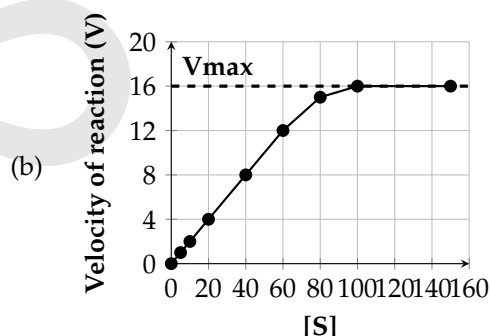
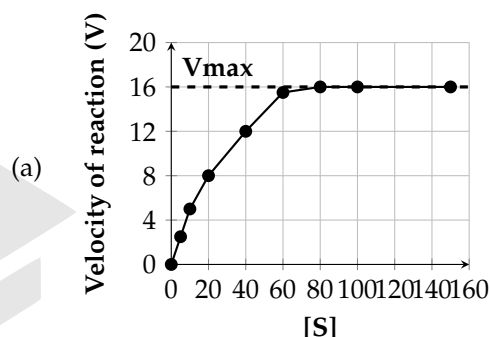
a. The cells with the non-recombinant plasmid can grow in the presence of ampicillin but not tetracycline

b. The cells with the non-recombinant plasmid can grow in the presence of tetracycline but not ampicillin

c. The cells with the recombinant plasmid can grow in the presence of ampicillin but not tetracycline

d. The cells with the recombinant plasmid can grow in the presence of both ampicillin and tetracycline

5. For which one of the following enzyme activity plots, will the K_m of the enzyme for substrate 'S' be 20? [S] indicates substrate concentration.



ANSWER KEY

1. A	2. A	3. C	4. A	5. A
6. A	7. D	8. A	9. D	10. B
11. A	12. D	13. C	14. B	15. C
16. C	17. C	18. A	19. D	20. D
21. A	22. B	23. D	24. A	25. A
26. B	27. A	28. D	29. B	30. B
31. D	32. D	33. B	34. A	35. D
36. A	37. A	38. B	39. A	40. C
41. B	42. C	43. A	44. B	45. D
46. D	47. D	48. B	49. C	50. C
51. A	52. B	53. D	54. B	55. C
56. A	57. B	58. A	59. C	60. C

PERFORMANCE ANALYSIS

Correct	Incorrect	Total Marks	Accuracy

$$\text{Total Marks} = (\text{Correct} \times 4) - (\text{Incorrect} \times 1) \quad | \quad \text{Accuracy} = (\text{Correct} / \text{Attempted}) \times 100$$

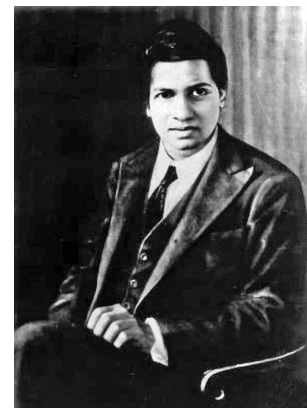
SPOTLIGHT | Srinivasa Ramanujan

The self-taught genius who rewrote the language of mathematics.

Born into a humble family in Tamil Nadu, Srinivasa Ramanujan had almost no formal training in advanced mathematics. He failed college because he devoted all his time to mathematics, leaving little attention for other subjects. With no degree and few supporters, he continued filling notebooks with extraordinary formulas.

His work eventually reached the renowned mathematician G. H. Hardy at Cambridge, who immediately recognized his exceptional brilliance. Ramanujan went on to make groundbreaking contributions to number theory, infinite series, and mathematical analysis, leaving behind thousands of results that continue to inspire research today.

Lesson: Talent opens doors, but relentless curiosity and perseverance create a lasting legacy.



ANSWER KEY

1. D	2. D	3. A	4. B	5. A
6. A	7. A	8. A	9. A	10. B
11. A	12. C	13. B	14. D	15. A
16. D	17. C	18. D	19. B	20. B
21. A	22. A	23. A	24. A	25. A
26. D	27. A	28. B	29. D	30. A
31. D	32. C	33. B	34. A	35. A
36. A	37. A	38. B	39. A	40. A
41. D	42. B	43. B	44. B	45. B
46. B	47. C	48. D	49. B	50. B
51. C	52. B	53. B	54. A	55. D
56. D	57. B	58. B	59. B	60. B

PERFORMANCE ANALYSIS

Correct	Incorrect	Total Marks	Accuracy

$$\text{Total Marks} = (\text{Correct} \times 4) - (\text{Incorrect} \times 1) \quad | \quad \text{Accuracy} = (\text{Correct} / \text{Attempted}) \times 100$$

SPOTLIGHT | Tessy Thomas

The "Missile Woman of India" who strengthened the nation's strategic shield.

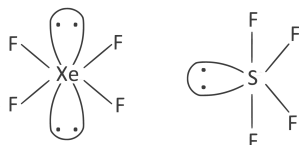
Growing up in a small town in Kerala, Tessy Thomas turned her fascination with science into an extraordinary career. Joining DRDO, she rose through determination and expertise to lead the development of the **Agni-IV** and **Agni-V** ballistic missiles, becoming the first woman to head an Indian missile project.

Her leadership proved that courage, knowledge, and perseverance can break every barrier, inspiring countless young scientists—especially women—to dream without limits.

Lesson: Determination and excellence can take you from ordinary beginnings to extraordinary achievements.



ing in a **see-saw** molecular shape.

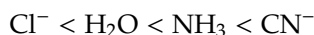


Hence,

XeF_4 is square planar, while SF_4 is see-saw.

SOL 20

The observed color of a complex is the complement of the color absorbed. A violet color is observed when yellow-green light is absorbed. The energy of the absorbed light depends on the crystal field splitting energy Δ_o . The spectrochemical series for the ligands is:



A weaker field ligand such as Cl^- produces smaller splitting, so the complex absorbs lower-energy (longer-wavelength) light. Therefore, $[\text{CoCl}(\text{NH}_3)_5]^{2+}$ has the weakest field ligand, absorbs yellow-green light, and appears violet.

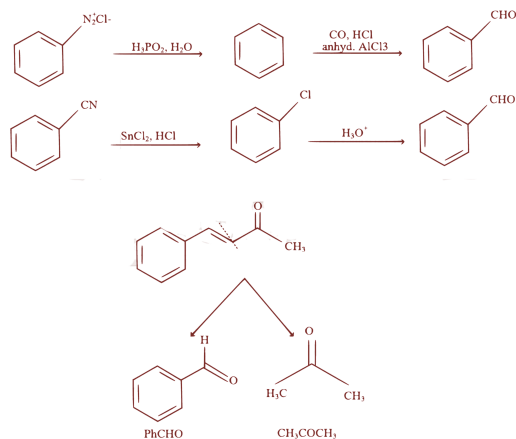
SOL 21

The two structures have the same molecular formula and connectivity. They differ only by rotation around the central carbon-carbon single bond. Therefore, they are **conformational isomers** (conformers).

SOL 22

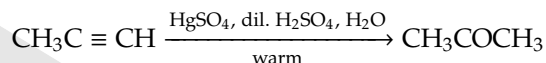
Generally, carboxylic acids (N) are more acidic than phenols (M, P, Q). However, picric acid (P), with three electron-withdrawing nitro groups, is exceptionally acidic—more than benzoic acid. Nitro groups stabilize the phenoxide anion via resonance/induction. p-Nitrophenol (Q) is more acidic than phenol (M) due to nitro substitution. Thus, the order is: P (picric acid) > N (benzoic acid) > Q (p-nitrophenol) > M (phenol)

SOL 23



SOL 24

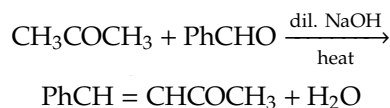
The first reaction is the **hydration of a terminal alkyne** in the presence of $\text{HgSO}_4/\text{dil. H}_2\text{SO}_4/\text{H}_2\text{O}$.



Thus,

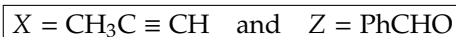


In the second step, acetone undergoes a **crossed aldol condensation** with benzaldehyde (PhCHO) in dilute NaOH. Since benzaldehyde has no α -hydrogen, only acetone forms the enolate. On heating, dehydration gives the α, β -unsaturated ketone (benzalacetone):



which is the product shown in the question.

Therefore,



SOL 25

Structure M is pyranose (6-membered ring) form of glucose, with anomeric OH on C1 axial (down): α -D-glucopyranose.

Structure N is furanose (5-membered ring) form of fructose, with anomeric OH on C2 up and $-\text{CH}_2\text{OH}$ down: corresponding to β -D-fructofuranose.

SOL 26

