zigyan

PREVIOUS YEAR PAPER · 2020-21

OLYMPIAD · STAGE I

IOQB

Indian Olympiad Qualifier in Biology (Part I)

2020-21

Question paper with official answer key

32	120	60 min	21
Questions	Maximum marks	Time	Paper code

Question paper and official answer key: Indian Association of Physics Teachers (IAPT), IOQB 2020-21, paper code 21.
Solutions and notes: Zigyan. This booklet is not an IAPT publication.

Prepare for the Olympiads with Zigyan

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JEE 2026 RESULTS

OUR TOPPERS

When talent meets the right guidance.

Saksham Bishnoi and Sulokya Bibhuty - our JEE 2026 toppers from Zigyan, Sector 16 - with the programme they took and the rank they earned.



Rahul Kaushik Sir
Founder & Director, Zigyan Eduvision
23 years of teaching



Saksham Bishnoi

4 YEARS CLASSROOM

JEE ADVANCED 2026	JEE MAIN 2026
AIR 168	AIR 811
	99.95 percentile



Sulokya Bibhuty

3 YEARS CLASSROOM

JEE ADVANCED 2026	JEE MAIN 2026
AIR 1,315	AIR 1,095
	99.94 percentile

OLYMPIAD RESULTS

Above the Minimum Admissible Score - the national band for the subject

CHEMISTRY

- Sulokya Bibhuty — 3 Years Classroom
- Anay Gupta — 3 Years Classroom
- Akshat Khator — 3 Years Classroom
- Harshit Goyal — 4 Years Classroom
- Hardik Sharma — 3 Years Classroom
- Aarush Kumar — 1 Year Classroom

PHYSICS

- Sulokya Bibhuty — 3 Years Classroom
- Saksham Bishnoi — 4 Years Classroom

ASTRONOMY

- Sulokya Bibhuty — 3 Years Classroom

MATHEMATICS (IOQM)

- Priyanshi — 4 Years Classroom

Saksham Bishnoi qualified the Chemistry Olympiad twice and was selected for the Orientation-cum-Selection Camp at HBCSE, Mumbai.

16 selections	16 of 35	AIR 168
in JEE Advanced 2026	students of the batch selected	best JEE Advanced rank

Start where they started.

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PART A-1 · ONE CORRECT OPTION

Q. 1 – 24 · +3 for a correct answer, –1 for a wrong one

1. The recombination frequencies of q, r, s and t genes on a chromosome were- t & q= 30%, r & s= 7%, s & t= 25% and r & q= 12%. Arrangement of these genes on the chromosome would be:

(A) q, r, s, t (B) s, q, r, t (C) q, s, r, t (D) t, s, q, r

2. Flagellum of which of the following has organization different from others?

(A) *Chlamydomonas reinhardtii* (B) *Vibrio cholerae*

(C) *Trypanosoma aruzi* (D) Gametes of *Ulothrix*

3. Which of the following polypeptide chain is translated from the following sense strand of 5' ATG AGA GTT GAG GAT TTA TCT 3'?

Ser – UCU; Leu – UUA; Glu – GAG; Met – AUG; Arg – AGA; Asp – GAU; Val – GUU

(A) COOH – Met – Arg – Val – Glu – Asp – Leu – Ser – H_2N

(B) COOH – Met – Glu – Leu – Arg – Asp – Val – Ser – H_2N

(C) H_2N – Met – Arg – Val – Glu – Asp – Leu – Ser – COOH

(D) H_2N – Met – Glu – Leu – Arg – Asp – Val – Ser – COOH

4. Abundance of trees bearing buttress roots indicates that the soil is:

(A) shallow and nutrient-poor. (B) shallow and dry.

(C) deep and nutrient rich. (D) deep and clayey.

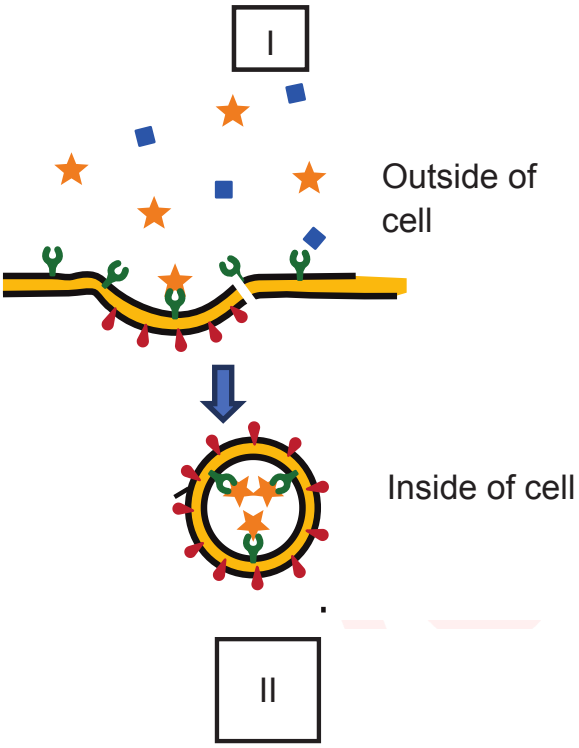
5. The identification tags on the cell membranes for cell- to-cell recognition are:

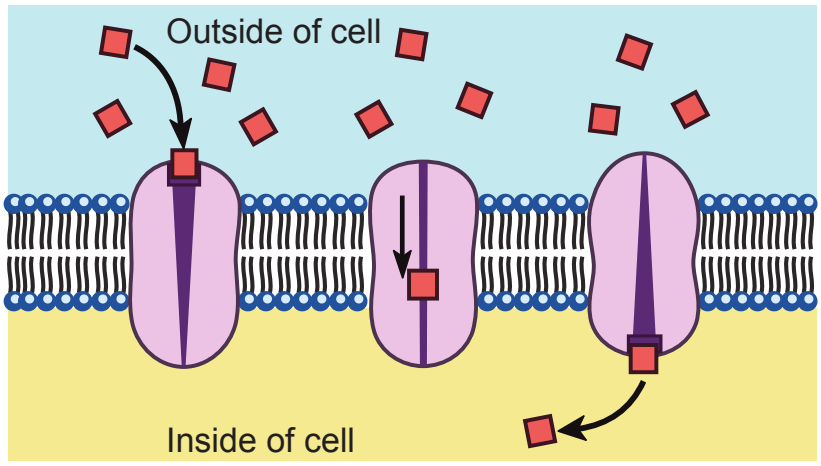
(A) Glycoproteins. (B) Lipoproteins. (C) Glycolipids. (D) Nucleoproteins.

6. Independent assortment has the possibility of producing different gametes. How many different gametes could possibly be produced in humans?

(A) 2^{46} (B) 23^2 (C) 46^2 (D) 2^{23}

7. Two processes of transport (I and II) are depicted. These processes respectively represent:



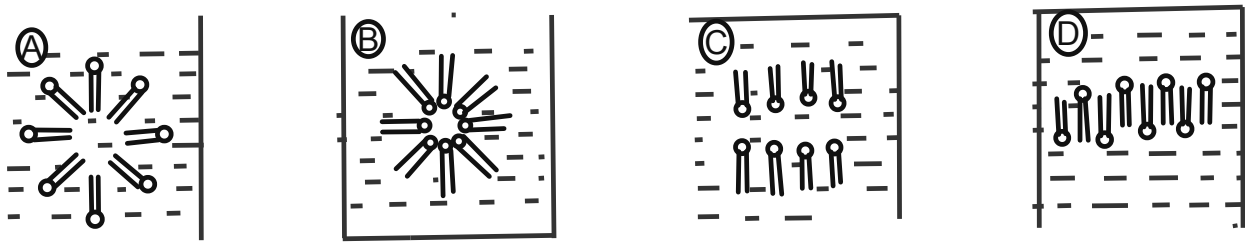


(A) Active transport and passive transport.
(B) Active transport for both.
(C) Passive transport for both.
(D) Passive and active transport.

8. The Eastern meadow lark and Western meadow lark are distinct biological species with similar body shape and coloration but different breeding songs which prevents members of these species from mating. This is an example of:

(A) pre-zygotic isolation.
(B) reduced hybrid viability.
(C) hybrid breakdown.
(D) temporal isolation.

9. Which of the following structures represents a stable lipid-water interaction in protoplasm?



(A) Structure A (B) Structure B (C) Structure C (D) Structure D

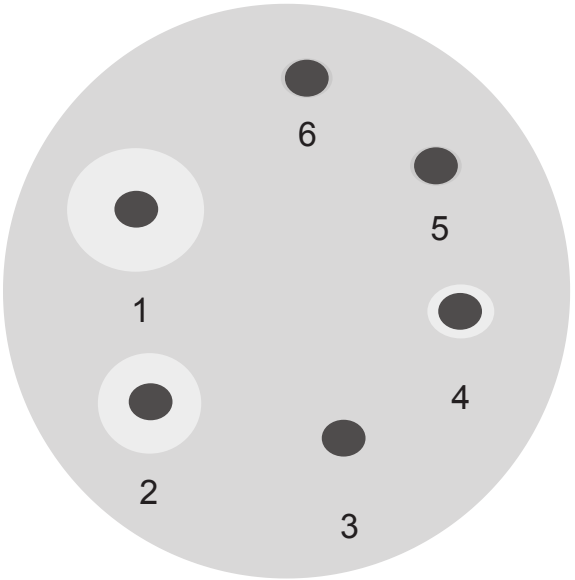
10. A group of hens was observed for 300 minutes and the aggressive pecking behavior was recorded. The numbers indicate the frequency with which the hen in the row pecks the hen in the column.

		P	Q	R	S
Row 1	**P**	-	0	0	0
Row 2	**Q**	59	-	17	92
Row 3	**R**	8	0	-	7
Row 4	**S**	6	0	0	-

The data obtained indicates the correct pecking order as:

(A) P > S > R > Q (B) Q > S > R > P (C) Q > R > S > P (D) S > Q > R > P

11. In order to study the digestive activity, samples from different parts of the gastro-intestinal tract were placed on an agar containing crab shell powder. The clearance zones numbered 1, 2, 3 and 4 indicate effect of liquids from stomach, duodenum, ileum and colon respectively of an animal 'X'. Distilled water was added to positions 5 and 6 as control.



The results indicate that the animal X is:

(A) a ruminant (B) a non-ruminant

(C) a hindgut fermenter (D) an insectivore

12. In 1914, McCollum and his co-workers showed that a factor isolated from butter fat (X) was non-saponifiable and when added to diet, could cure xeropthalmia in young rats and bone deformities in puppies. These conditions could not be cured by yeast suspension (Y) or orange juice (Z) and also by heated butter fat. The likely factors present in X, Y and Z are respectively:

(A) Vitamin (A and D), B, C.
(B) Vitamin A, D, E.
(C) Vitamin B_1, B_2, B_{12}.
(D) Vitamin A, C, D.

13. A comparison of certain cell structures in three types of cells P, Q and R are tabulated below.

	Cell wall	**ER**	**Nucleus**	**Mitochondria**
P	Absent	Present	Present	Present
Q	Present	Absent	Absent	Absent
R	Present	Present	Present	Present

P, Q and R could respectively represent:

(A) Onion cell, *E. coli*, Mushroom cell
(B) Mouse cell, *E. coli*, *Amoeba*
(C) *E. Coli*, Mushroom cell, Onion cell
(D) *Amoeba*, *E. coli*, Onion cell

14. Consider the following situations.

I: Over several generations, *Drosophila* flies are attracted to lower light intensities than higher light intensities.

II: Duck eggs of intermediate weight have the highest hatching success.

The processes of selection underway in I and II respectively are:

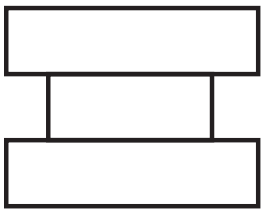
(A) Disruptive and Stabilizing
(B) Stabilizing and Directional
(C) Directional and Disruptive
(D) Directional and Stabilizing

15. If a cell has solute potential of −2000 kPa and water potential of −1600 kPa, what will be the pressure potential of the cell?

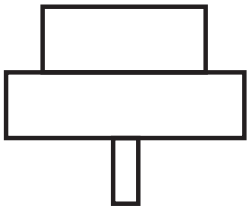
(A) −400 kPa (B) 400 kPa (C) −3600 kPa (D) 3600 kPa

16. For an ecosystem comprising of a tree, birds and parasites, the biomass pyramid will take the shape of:

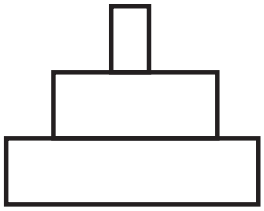
(A)



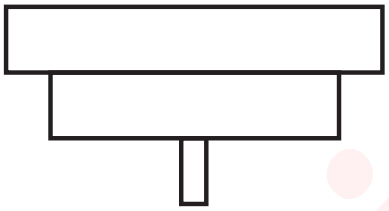
(B)



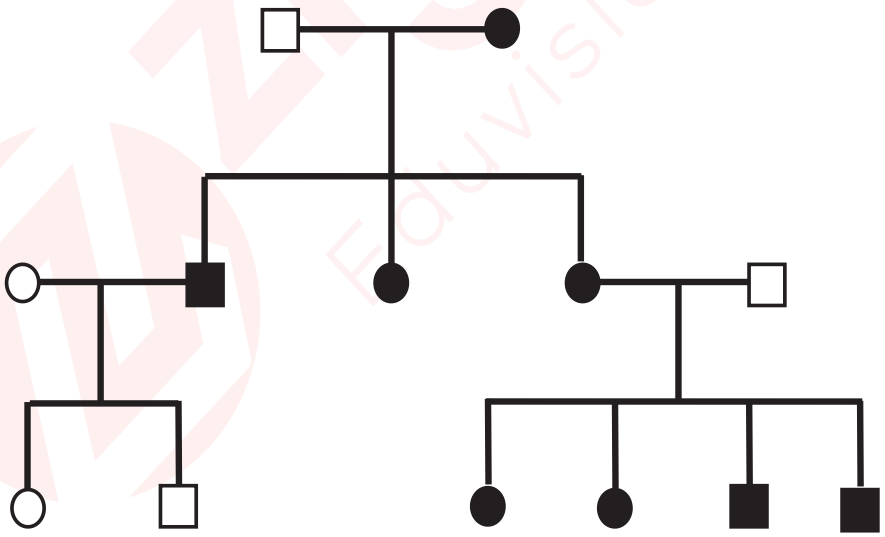
(C)



(D)



17. Inheritance of a disease trait observed in a family is represented below. It most likely indicates:



(A) Autosomal dominance.
(B) Mitochondrial inheritance.
(C) Autosomal recessive trait.
(D) X- linked recessive trait.

18. The drug cytochalasin B blocks the function of actin. Which of the following aspects of the cell cycle would be more disrupted by cytochalasin B?

(A) Spindle attachments to kinetochores.
(B) DNA synthesis.
(C) Cell elongation during anaphase.
(D) Cleavage furrow formation.

19. A mixture of samples containing DNA fragments a, b, c and d with molecular weights a + b = c, a > b and d > c, was subjected to agarose gel electrophoresis. What would be the sequence of bands from anode to cathode?

(A) b, a, c, d (B) d, c, a, b (C) a, b, d, c (D) c, d, b, a

20. Lack of permeability to water is very rare among biological membranes but is critical to the functioning of which of the following regions of a nephron?

(A) Descending limb of the loop of Henle. (B) Ascending limb of the loop of Henle.
(C) Distal tube. (D) Collecting duct.

21. This fruit is a rich source of lycopene, contains 92% water by weight and pH of its pulp varies between 5 to 7. This fruit is likely to be:

(A) Lime (B) tomato (C) apple (D) watermelon

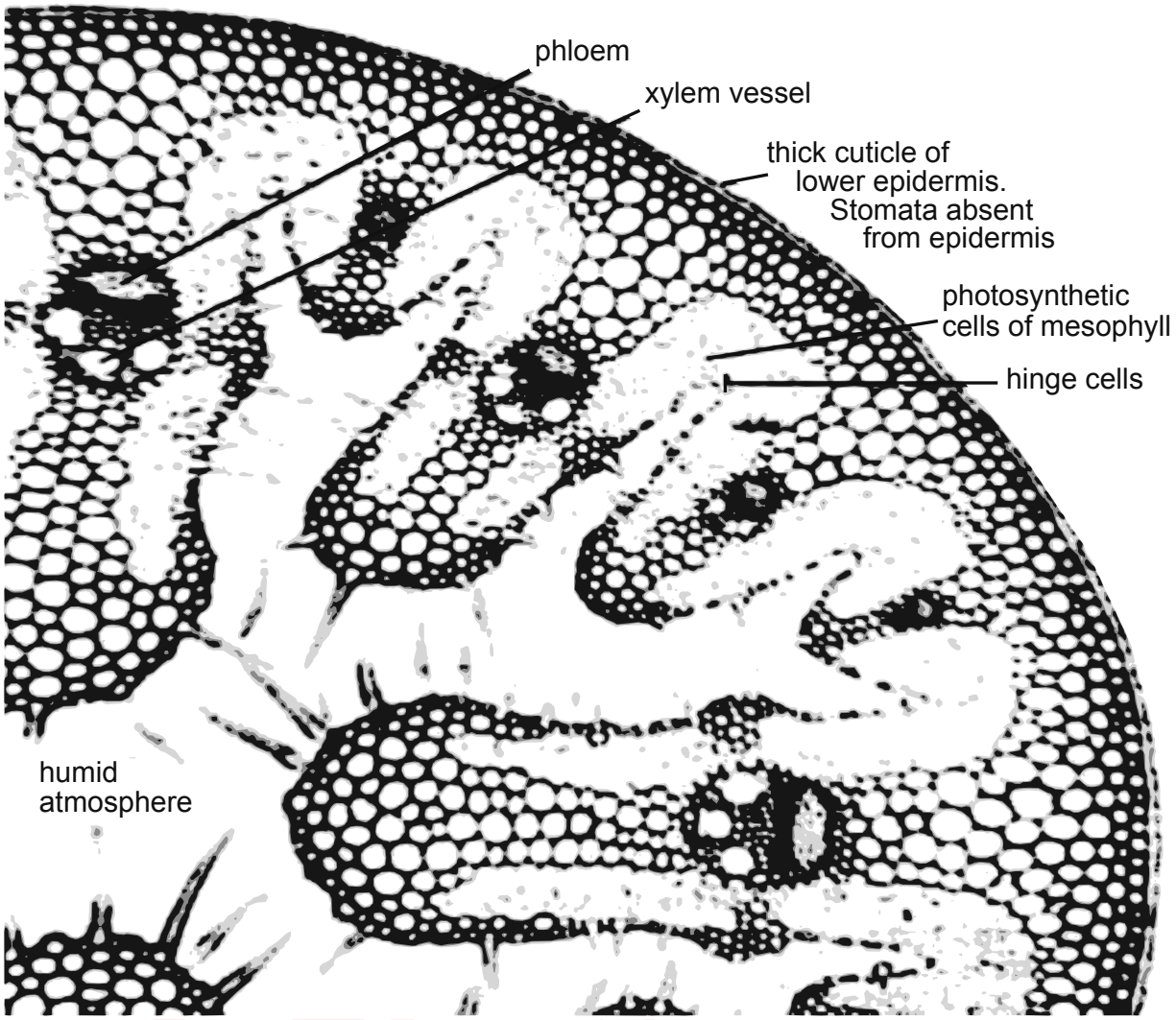
22. Shingle beaches (or pebble beaches) have low animal biodiversity mainly because of:

(A) very high wave effects. (B) high salinity.
(C) unstable substratum. (D) steep slope.

23. In flowering plants, self-pollination is often prevented through self-incompatibility. It is controlled by multiple alleles. Assuming that there are three alleles S_1, S_2 and S_3 for this and that self-incompatibility occurs if the pollen and tissue of stigma-style have an allele in common, what proportion of pollen produced by S_1S_2 plant would germinate on plants with genotype S_2S_3?

(A) 0% (B) 25% (C) 50% (D) 75%

24. The accompanying diagram represents a cross section of leaf blade of a grass. The anatomical features suggest it to be a:



(A) xerophyte (B) hydrophyte (C) hygrophyte (D) mesophyte

PART A-2 · ONE OR MORE CORRECT OPTIONS

Q. 25 – 32 · 6 marks only if all correct options are marked · no negative marking

25. Birdwatchers often take the count of different birds in the area to comment upon its biodiversity. The accompanying table gives such a data for three regions 1, 2 and 3. Assume that the three regions match in terms of environmental factors and equal time is spent for watching for all the three plots.

	Plot 1	Plot 2	Plot 3
Magpie Robin	2	2	2
Indian Robin	3	2	4
Ring Dove	2	2	2
Drongo	3	1	2
Sparrow	4	25	6
Crow	1	18	3
Oriole	0	1	2
Minivet	0	1	1
Flycatcher	0	1	1

Which of the following statements is correct?

(A) Greater variety of resources is available in plot 2 than plot 3.

(B) Biodiversity of plots 2 and 3 is the same.

(C) Resource utilization is more even in plot 3 than plot 2.

(D) More reliable data can be obtained if observations are made during nesting season of the birds.

26. Within a population's geographic range, local densities may differ substantially creating contrast patterns of dispersion. Which of the following examples represent clumped dispersion?

(A) Mushrooms growing on rotting log.

(B) Birds nesting on small islands exhibiting territoriality.

(C) Mayfly adult populations which survive only for a day or two.

(D) Growth of dandelion plants from wind-blown seeds.

27. In nature, species interact with its abiotic as well as biotic components. Biological *interactions can be classified into different categories based on whether they are beneficial (+), harmful (-) or neutral (0) to each of the participating member. In*teractions of two species are depicted at positions P and Q in the table.

Interaction	+	–	0
+			
–	P	Q	
0			

P and Q respectively indicate:

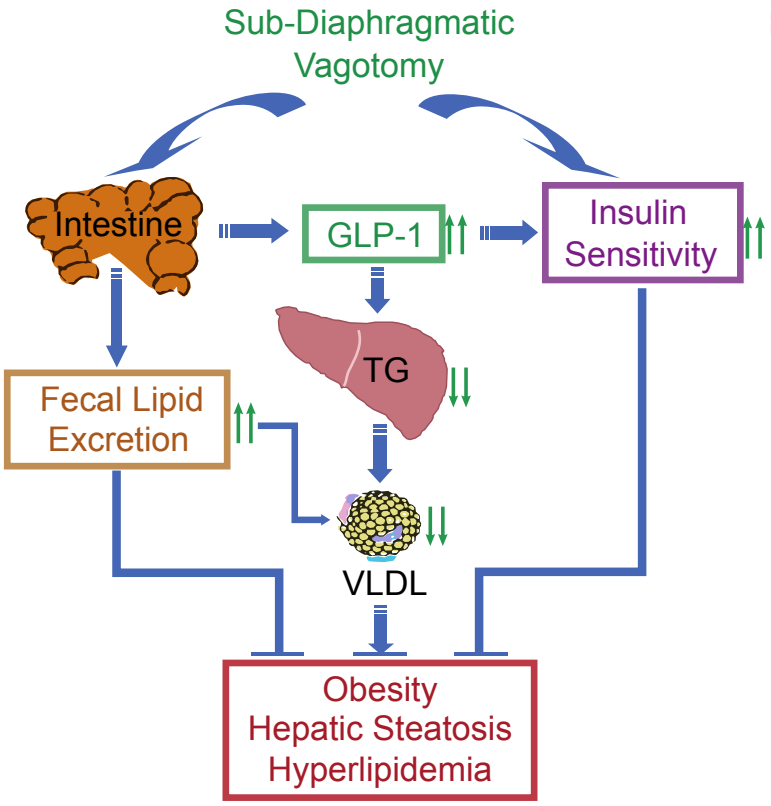
(A) Competition, parasitism

(B) Predation, parasitism

(C) Predation, competition

(D) Parasitism, competition

28. The diagram depicts the regulatory mechanism mediated through Glucagon like Peptide1 (GLP-1) in a mouse in which the vagus connection to hepatic – gut region has been severed.



Which of the following can be correctly deduced from the diagram?

(A) GLP-1 antagonists can increase steatorrhea (excretion of abnormal quantities of fat with the feces).

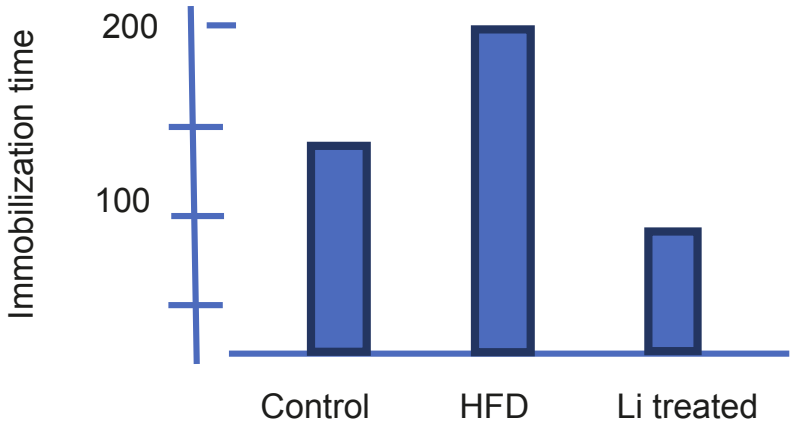
(B) GLP-1 agonists can reduce post-prandial hyperglycemia.

(C) GLP-1 agonists can reduce VLDL in the plasma.

(D) GLP-1 antagonists can decrease fasting blood sugar.

29. The *tail suspension test* (TST) is developed to study the effect of drugs or chemicals on the behavior of rats. The test involves suspending mice above the ground by their tails for a period of 6 minutes. The time spent by the mouse to show any escape related activity is measured. It is subtracted from the total time to get immobilization time. It is based on the assumption that an animal will actively try to escape an aversive stimulus. If escape is impossible, the animal will eventually stop trying ("give up").

When rats fed with high fat diet (HFD) and those fed with lithium were tested using TST, the following results were obtained.



Which of the following statements are true?

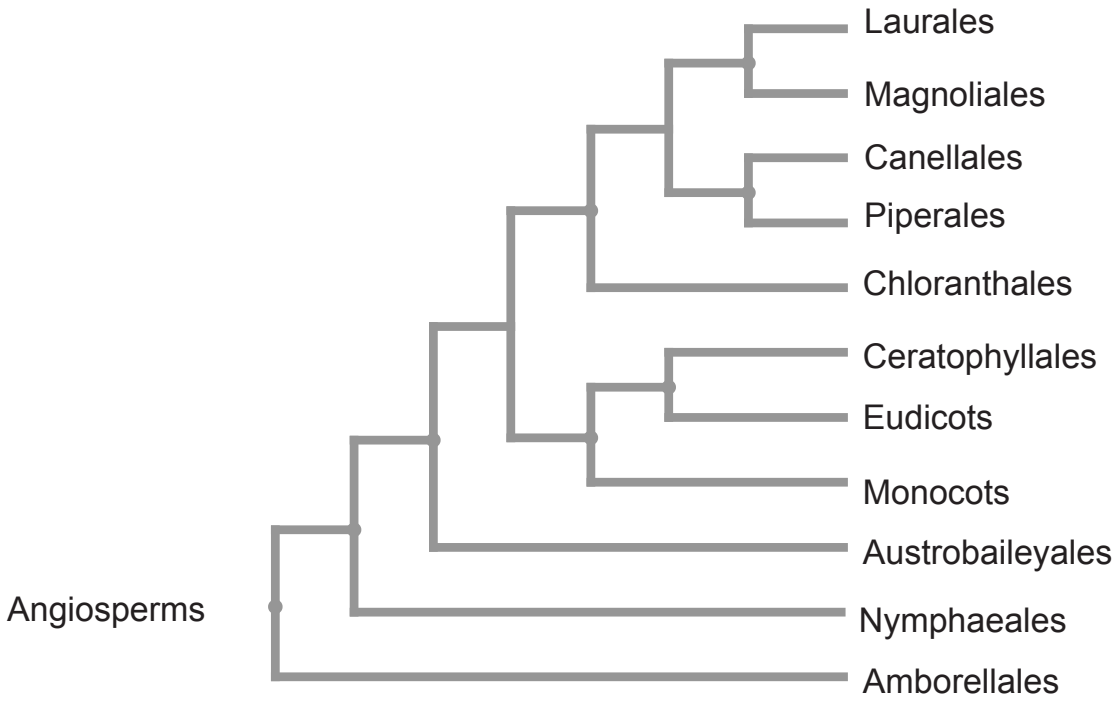
(A) High caloric value of HFD provided more energy to the mice.

(B) Li proves toxic to brain tissues and increases stress of mice.

(C) High fat content in the diet led to less agility and lesser efforts to escape the aversive situation.

(D) Li has improved the stress overcoming efforts of the mice.

30. Study the given cladogram and state which of the following statements is/are true.



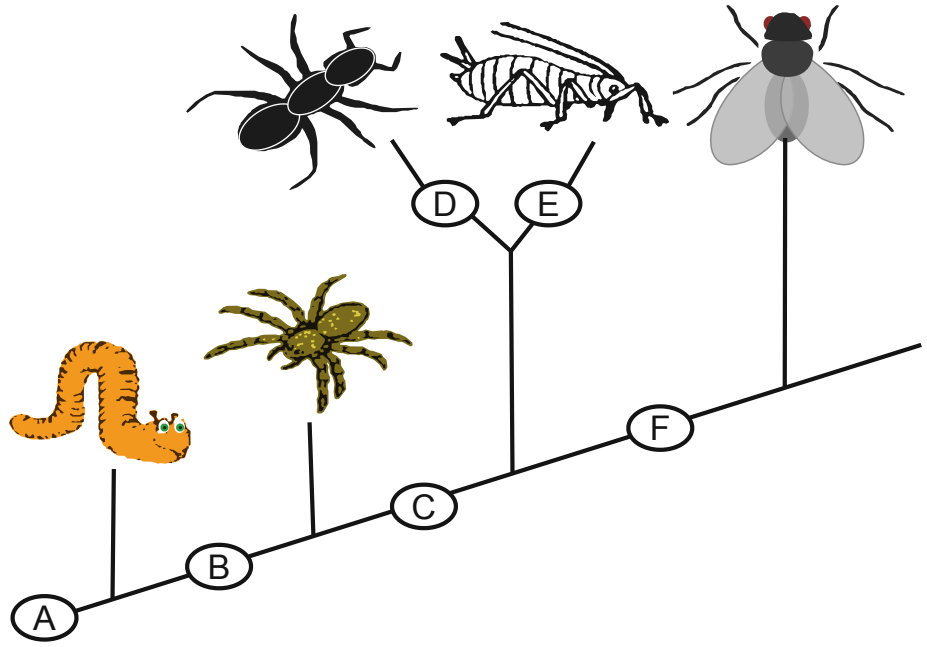
(A) Laurales cannot be considered as an outgroup.

(B) Austrobaileyales and Nymphaeales are polyphyletic groups.

(C) Eudicots and Monocots are paraphyletic orders.

(D) Chloranthales are more closely related to Piperales than to Canellales.

31. Based on the cladogram given below, match the following derived characteristics listed in the table with the alphabets A – D and choose the correct option/s.



Number	Characteristic
1	Legs
2	Cerci
3	Segmented Body
4	6 legs
5	Wings
6	Crushing Mouthparts

(A) A: 6; C: 5; F: 2 (B) B: 2; D: 4; E: 6 (C) B: 1; E: 2; F: 5 (D) A: 3; C: 4; D: 6

32. Which of the following are the possible agents of change in allele frequency?

(A) Random mating.
(B) Gene flow.
(C) Genetic drift.
(D) Assortative mating.

ANSWER KEY

IOQB 2020-21 · PAPER CODE 21

32
QUESTIONS · 120 MARKS

IAPT final answer key for paper code 21. ★ marks an answer given as per Zigyan.

1	(C)	2	(B)	3	(C)	4	(A)	5	(A)
6	(D)	7	(A)	8	(A)	9	(A)	10	(C)
11	(D)	12	(A)	13	(D)	14	(D)	15	(B)
16	(C)	17	(B)	18	(D)	19	(A)	20	(B)
21	(D)	22	(C)	23	(C)	24	(A)	25	(C), (D)★
26	(A), (C)	27	(C), (D)	28	(B), (C)	29	(C), (D)★	30	(A)★
31	(C), (D)	32	(B), (C)★						

★ Answers as per Zigyan

- **Q25** — As per Zigyan: (C), (D); IAPT key (C), (D).
- **Q29** — As per Zigyan: (C), (D); IAPT key (C), (D).
- **Q30** — As per Zigyan: (A); IAPT key (A), (C).
- **Q32** — As per Zigyan: (B), (C); IAPT key (B), (C), (D).

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OLYMPIADS · 2026

Olympiad results



TOP ACHIEVEMENT · CHEMISTRY

Qualified the Chemistry Olympiad twice, and selected for the HBCSE camp.

Saksham Bishnoi reached the national stage of the Chemistry Olympiad in two consecutive years and was selected for the Orientation-cum-Selection Camp at HBCSE, Mumbai. 4 Years Classroom - the same student who took AIR 168 in JEE Advanced 2026.

Qualified twice | HBCSE selection camp | Only student from Faridabad

Above MAS means above the **Minimum Admissible Score**: clearing it puts a student in the national band for their subject. It is a real threshold, not a participation marker.

CHEMISTRY · ABOVE MAS



Sulokya Bibhuty
Class XII
3 Years Classroom
Above MAS



Anay Gupta
Class XI
3 Years Classroom
Above MAS



Akshat Khator
Class XI
3 Years Classroom
Above MAS



Harshit Goyal
Class XII
4 Years Classroom
Above MAS



Hardik Sharma
Class XI
3 Years Classroom
Above MAS



Aarush Kumar
Class XII
1 Year Classroom
Above MAS

PHYSICS · ASTRONOMY · MATHEMATICS

PHYSICS



Sulokya Bibhuty
Class XII
3 Years Classroom
Above MAS

PHYSICS



Saksham Bishnoi
Class XII
4 Years Classroom
Above MAS

ASTRONOMY



Sulokya Bibhuty
Class XI
3 Years Classroom
Above MAS

MATHEMATICS · IOQM



Priyanshi
Class XI
4 Years Classroom
IOQM Qualifier

OLYMPIADS WE PREPARE STUDENTS FOR

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Physics	Chemistry	Biology	Astronomy	Mathematics	Class X and below

The olympiad pathway starts in Class 8.

NSEJS is open to Class 10 and below - the habit of staying with one hard problem is the one JEE Advanced rewards.

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RESULTS · 2021 – 2026

Our toppers, year by year

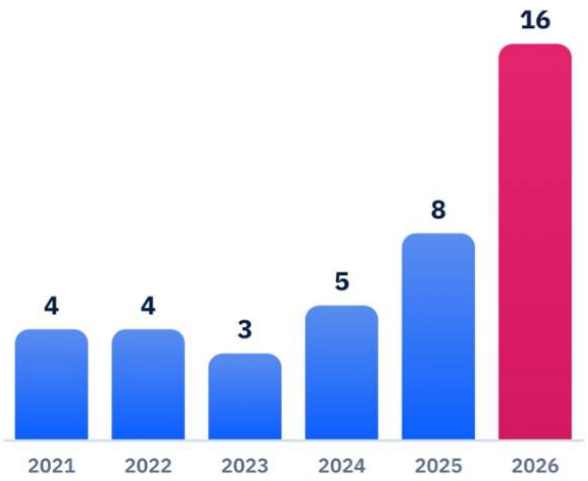
40
JEE Advanced selections in 6 years

AIR 168
best rank — Saksham Bishnoi, 2026

16 of 35
students selected, JEE Advanced 2026

14 of 35
above 98 percentile, JEE Main 2026

JEE ADVANCED SELECTIONS PER YEAR



BEST RANK EACH YEAR

YEAR	JEE ADVANCED	JEE MAIN
2026	**Saksham Bishnoi** AIR 168 · 4 Years Classroom	**Saksham Bishnoi** AIR 811 · 99.95 %ile
2025	**Chakshu** AIR 4,233 · 2 Years Classroom	**Chakshu** AIR 8,538 · 99.44 %ile
2024	**Harshit** AIR 777 · 2 Years Classroom	**Harshit** AIR 1,473 · 99.91 %ile
2023	**Aditya Jain** AIR 2,373 · 2 Years Classroom	**Aditya Jain** AIR 2,503 · 99.79 %ile
2022	**Rachit Sharma** AIR 698 · 1 Year Classroom	**Rachit Sharma** AIR 1,016 · 99.90 %ile
2021	**Sparsh Mittal** AIR 2,237 · 1 Year Classroom	**Sparsh Mittal** AIR 1,562

JEE ADVANCED 2026 — THIRTEEN NAMED SELECTIONS



Saksham Bishnoi
AIR 168
4 Years Classroom



Sulokya Bibhuty
AIR 1,315
3 Years Classroom



Aarush
AIR 2,699
1 Year Classroom



Manishka
AIR 2,869
4 Years Classroom



Oojit Kumar
AIR 5,765
4 Years Classroom



Harshit Goyal
AIR 6,407
4 Years Classroom



Pranab Sharma
AIR 6,750
3 Years Classroom



Aditya Dhar
AIR 15,183
3 Years Classroom



Arpit Anshuman
AIR 19,308
4 Years Classroom



Lokesh
AIR 22,857
3 Years Classroom



Arjun
AIR 24,674
3 Years Classroom



Sanyam Gulyani
AIR 25,123
1 Year Classroom



Saket
AIR 27,628
3 Years Classroom

Sixteen students of the 2026 batch were selected in JEE Advanced; the thirteen above are named with their All India Rank.

JEE MAIN 2026 — TOP SIX, WITH PERCENTILE



Saksham Bishnoi
AIR 811
99.95 %ile
4 Years Classroom



Sulokya Bibhuty
AIR 1,095
99.94 %ile
3 Years Classroom



Harshit Goyal
AIR 2,662
99.83 %ile
4 Years Classroom



Manishka
AIR 4,817
99.70 %ile
4 Years Classroom



Oojit Kumar
AIR 5,040
99.69 %ile
4 Years Classroom



Aarush
AIR 5,276
99.67 %ile
1 Year Classroom

14 of the 35 students in the 2026 batch scored above the 98th percentile in JEE Main.

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