

IAT 2025 ULTIMATE MOCK TEST

Subjects: Physics, Chemistry, Mathematics, Biology

Time: 180 minutes | Maximum Marks: 240

• Instructions To Candidates

- 1. This Question Paper contains 60 multiple-choice questions (MCQs).
- 2. Each question has 4 options, only one of which is correct.
- 3. The test consists of 4 sections with 15 questions each:

Biology (15 Questions) Chemistry (15 Questions) Mathematics (15 Questions) Physics (15 Questions)

- 4. Each correct answer earns 4 marks.
- 5. Each incorrect answer results in a deduction of 1 mark.
- 6. No marks will be awarded or deducted for unattempted questions.
- 7. The total time allowed is 180 minutes.
- 8. Maximum Marks: 240



Biology

IAT 2025

ULTIMATE

MOCK TEST

1. An experiment inspired by Miller's work was conducted to study the origin of life under early Earth conditions. The experimental setup included gases mimicking the primitive atmosphere, high temperatures, and electrical sparks to simulate lightning. Which of the following claims is most inconsistent with the chemical evolution hypothesis supported by Miller's experiment?

(A) Oxygen gas was included in the experimental mixture as it was abundant in the early atmosphere.

- (B) Amino acids like glycine and alanine were synthesized under these simulated conditions.
- (C) The gases used in the experiment were hydrogen, methane, ammonia, and water vapor.
- (D) Energy sources like ultraviolet light or electrical discharge can drive the formation of organic compounds.

2. A researcher discovered a white, filamentous growth on decomposing leaf litter in a forest. Microscopic examination revealed:

Branched thread-like filaments with cell walls containing chitin.

Cross-walls dividing the filaments into compartments, each containing a single nucleus.

Specialized reproductive structures at the tips of some filaments, releasing small spores. When these spores were isolated and placed in a nutrient-rich medium, they germinated to form similar filamentous structures. Based on these characteristics, the organism is most likely classified under:

- IGGKC

- (A) Kingdom: Fungi; Phylum: Zygomycota (zygomycete fungi)
- (B) Kingdom: Fungi; Phylum: Basidiomycota (club fungi)
- (C) Kingdom: Protista; Phylum: Oomycota (water molds)
- (D) Kingdom: Fungi; Phylum: Ascomycota (sac fungi)

3. In the evolution of chordates, the notochord is an essential structural feature. In vertebrates, it is replaced by the vertebral column as development progresses. Which of the following statements best explains the evolutionary advantage of the vertebral column over the notochord?

(A) The vertebral column provides enhanced protection to the spinal cord and supports a greater body size.(B) The vertebral column enhances flexibility by completely eliminating rigid structures like the notochord.(C) The vertebral column functions as a primary digestive structure while maintaining axial support.(D) The vertebral column allows for simultaneous locomotion and nutrient absorption in aquatic environments.

4. Which of the following statements about vascular bundles and their arrangement in plants is correct?

(A) In monocot stems, vascular bundles are scattered and typically lack cambium, making them closed.(B) In dicot stems, the vascular bundles are arranged in a ring, and the absence of cambium makes them closed.

(C) When xylem and phloem are arranged in separate bundles along different radii, the arrangement is called radial, as seen in stems.

(D) The conjoint vascular bundles in stems always have phloem located on both sides of xylem.

5. Which of the following is responsible for secondary growth in plants ?

(A) Pholem

(B) Xylem

(C) Vascular bundles

(D) Epidermis

6. In a savanna ecosystem, the following food chain is observed:

Grass \rightarrow Herbivore (Antelope) \rightarrow Carnivore (Lion)

If the population of the apex predator (lion) decreases drastically, which of the following is the most likely outcome in this ecosystem?

(A) Increased grass biomass due to decreased herbivore grazing, leading to enhanced primary productivity.
(B) Overpopulation of antelope, leading to overgrazing of grass and eventual degradation of the ecosystem.
(C) No noticeable effect on the ecosystem as the herbivore and plant populations will regulate each other.
(D) Herbivore population will decrease due to the absence of their natural predators, and grass biomass will rise.

7. In a study aimed at understanding the evolutionary relationship between two eukaryotic species, researchers compared two homologous proteins, along with their corresponding RNA and DNA sequences. Based on their findings, which of the following conclusions is most likely accurate?

(A) Differences in protein sequences but conservation of active site residues can indicate convergent evolution.

(B) Similarity in protein sequences, but not in RNA or DNA sequences, is indicative of divergent evolution.

(C) Similarity in introns, but not in exons, is a hallmark of convergent evolution.

(D) Similarity in exons, but not necessarily in introns, suggests divergent evolution.

8. Two species of frogs from the same genus were observed in their breeding behavior in a shared pond. Under normal lighting conditions, females of each species preferred to mate with males of their own species. However, when the lighting was changed to ultraviolet (UV) light, the females showed no such preference and mated indiscriminately with both species. Which of the following conclusions best explains this behavior?

(A) The preference of females to mate with males of their own species under normal lighting suggests that the frogs likely diverged through allopatric speciation.

(B) The preference of females under normal lighting and the absence of preference under UV light indicates that the two species might have undergone sympatric speciation due to behavioral isolation.

(C) The difference in mating behavior is likely due to the UV light enhancing species-specific pheromone detection that the females rely on.

(D) The difference in mating behavior is because UV light alters the species-specific visual signals that the females normally use to identify mates.

9. In a population of individuals living in regions where malaria is prevalent, 16% of individuals have the homozygous genotype for cystic fibrosis (FF), a recessive genetic disorder. Cystic fibrosis provides a protective advantage against tuberculosis. Assuming the population is in Hardy-Weinberg equilibrium, what percentage of the population carries one copy of the cystic fibrosis allele (heterozygous, Ff) and thus benefits from the protection against tuberculosis?

- (A) 48%
- (B) 32%
- (C) 40%
- (D) 16%

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

(A) Meiotic recombination takes place in both males and females.

- (B) The end products of meiosis II are haploid gametes.
- (C) The four products of meiosis are genetically different.
- (D) In most flowering plants, only one of the four products of meiosis survives in females.

11. Which compound given below inhibits cholesterol synthesis in humans?

- (A) Streptokinase
- (B) Statins
- (C) Penicillin
- (D) Cyclosporin A

12. During an oxidative phosphorylation the terminal electron acceptor is _____ (fill up the blank)

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- (A) FAD
- (B) NAD+
- (C) Oxygen
- (D) Cytochrome

13. The pedigree below tracks the presence of attached earlobes through a family's generation. Having attached earlobes is an autosomal recessive trait. If individuals I-1 and I-2 had a fourth child, what is the chance that the child would have attached earlobes?

(A) 50%
(B) 25%
(C) 75%
(D) 100%



14. Which of these factors is least likely to cause deviation from the Hardy-Weinberg equilibrium?

(A) Gene flow

- (B) Reduction in population size
- (C) Genetic drift

(D) Mutation

15. Polymerase chain reaction (PCR) is used to amplify a gene of interest (GOI). If, after 30 cycles of PCR, 1 billion copies of GOI are produced, approximately how many copies of GOI were present at the end of the 20th cycle?

(A) 1 million

(B) 0.66 billion

(C) 10 million

(D) 0.1 billion

Chemistry

16. Choose the correct statements.

(A) Weight of a substance is the amount of matter present in it.

(B) Mass is the force exerted by gravity on an object.

(C) Volume is the amount of space occupied by a substance.

(D) Temperatures below 0°C are possible in Celsius scale, but in Kelvin scale negative temperature is not possible.

(E) Precision refers to the closeness of various measurements for the same quantity.

Choose the correct answer from the options given below :

(A) (A), (D) and (E) Only (B) (C), (D) and (E) Only (C) (A), (B) and (C) Only (D) (C) and (D) Only

17. The calculated spin-only magnetic moments of K3[Fe(OH)6] & K4[Fe(OH)6] respectively are

(A)3.87 and 4.90 B.M. (B)4.90 and 5.92 B.M. (C)4.90 and 4.90 B.M. (D)5.92 and 4.90 B.M.

17. Which of the following is/are not correct with respect to energy of atomic orbitals of hydrogen atom?
(A)1 s<2p<3 d<4 s1 s<2p<3 d<4 s
(B) 1 s<2 s=2p<3 s=3p1 s<2 s=2p<3 s=3p
(C) 1 s<2 s<2p<3 s<3p1 s<2 s<2p<3 s<3p
(D) 1 s<2 s<4 s<3 d1 s<2 s<4 s<3 d
Choose the correct answer from the options given below :

(A) (A) and (C) only (B) (B) and (D) only (C) (C) and (D) only (D) (A) and (B) only

18. The type of oxide formed by the element among Li,Na,Be,Mg,BLi,Na,Be,Mg,B and Al that has the least atomic radius is :

(A) A20 (B) A203 (C) A02 (D) A0

19. Which of the following relations are correct? (A) $\Delta U=q+p\Delta V$ (B) $\Delta G=\Delta H-T\Delta S$ (C) $\Delta S=qrev/T$ (D) $\Delta H=\Delta U-\Delta nRT$ Choose the most appropriate answer from the options given below :

(A) C and D only(B) B and C only(C) A and B only(D)vB and D only

20. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R). Assertion (A) : NH3 and NF3 molecule have pyramidal shape with a lone pair of electrons on nitrogen atom. The resultant dipole moment of NH3 is greater than that of NF3.

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Reason (R) : In NH3, the orbital dipole due to lone pair is in the same direction as the resultant dipole moment of the N–H bonds. F is the most electronegative element.

In the light of the above statements, choose the correct answer from the options given below :

(A) Both (A) and (R) are true and (R) is the correct explanation of (A)
(B) (A) is false but (R) is true
(C) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)
(D) (A) is true but (R) is false

21. The values of Henry's law constant of Ar, CO_2 , CH_4 , and O_2 in water at 25°C are 40.30, 1.67, 0.41, and 34.86 kbar, respectively. The order of their solubility in water at the same temperature and pressure is

(A) $Ar > O_2 > CO_2 > CH_4$ (B) $CH_4 > CO_2 > Ar > O_2$ (C) $CH_4 > CO_2 > O_2 > Ar$ (D) $Ar > CH_4 > O_2 > CO_2$



(A) (ii) in water, (i) in chlorobenzene.

(B) (iii) in water, (i) in chlorobenzene.

(C) (iii) in water, (ii) in chlorobenzene.

(D) (ii) in water, (iii) in chlorobenzene.

27. Fusion of MnO_2 with KOH in presence of O_2 produces a salt (W). Alkaline solution of (W) upon electrolytic oxidation yields another salt (X). The manganese containing ions present in (W) and (X), respectively, are (Y) and (Z). Which of the following statement is incorrect:

(A) (Y) is diamagnetic in nature while (Z) is paramagnetic(B) Both (Y) and (Z) are coloured and have tetrahedral shape

(C) In both (Y) and (Z), π -bonding occurs between p-orbitals of oxygen and d-orbitals of manganese.

(D) In aqueous acidic solution, (Y) undergoes a disproportionation reaction to give (Z) and MnO₂.

28. For a reaction taking place in a container in equilibrium with its surroundings, the effect of temperature on its equilibrium constant K in terms of change in entropy is described by

(A) With increase in temperature, the value of K for exothermic reaction decreases because the entropy change of the system is positive.

(B) With increase in temperature, the value of K for endothermic reaction increases because unfavourable change in entropy of the surroundings decreases.

(C) With decrease in temperature, the value of K for exothermic reaction decreases because favourable change in entropy of the surroundings decreases.

(D) With increase in temperature, the value of K for endothermic reaction increases because entropy change of the system negative.

29. 4.5 g of compound A (Molecular Weight = 90) was used to make 250 mL of its aqueous solution. The molarity of the solution in M is $x \times 10^{-1}$. The value of x is? (rounded off to the nearest integer).

(A) 1 (B) 2 (C) 4

(D) 3

30. If a compound AB dissociates to the extent of 75% in an aqueous solution, the molality of the solution which shows a 2.5 K rise in the boiling point of the solution is? (in molal). (Rounded-off to the nearest integer). [Given: $K_b = 0.52 \text{ K kg mol}^{-1}$]

(A) 1 (B) 2 (C) 3 (D) 4



36. A tuning fork produces 5 beats per second with another tuning fork of frequency 284 Hz. The first one is now loaded with a little wax and the beat frequency is found to increase to 8 per second. What was the original frequency of the tuning fork?

(A) 265 Hz
(B) 279 Hz
(C) 292 Hz

(D) 287 Hz

37. A stationary nucleus splits into two smaller nuclei with mass ratios of 3 : 1. Following the split, how will the nuclei move?

(A) In opposite directions with speed in the ratio of 1 : 3 respectively.

(B) In opposite directions with speed in the ratio of 3 : 1 respectively.

(C) In the same direction with same speed.

(D) In opposite directions with the same speed.

38. During a Young's double slit experiment, where the slit separation is 2.0 mm, the light's wavelength is 600 nm, and the screen is 2.0 m away from the slits, the intensity at the center of the central maximum measures 0.20 W/m^2 . Determine the light intensity at a location 0.5 cm from the center, across the fringe pattern.

(A) 0.10 W/m² (B) 0.05 W/m² (C) 0.15 W/m² (D) 0.025 W/m²



39. A simple pendulum is released from rest at the horizontal position. When the string makes an angle θ with the vertical, the angle φ which the acceleration vector of the bob makes with the string is given by:

(A) $\varphi = 0$ (B) $\varphi = \tan^{-1}(\tan \theta / 2)$ (C) $\varphi = \tan^{-1}(2 \tan \theta)$ (D) $\varphi = \pi / 2$

40. The potential energy of a point particle is given by the expression $V(x) = -\alpha x + \beta \sin(x/\gamma)$. A dimensionless combination of the constant α , β and γ is:

(A) α/βγ
(B) α²/βγ
(C) γ/αβ
(D) αγ/β

41. The maximum value attained by the tension in the string of a swinging pendulum is four times the minimum value it attains. There is no slack in the string. The angular amplitude of the pendulum is:

(A) 90° (B) 60° (C) 45°

(D) 30°

42. A hollow sphere of mass M and radius R slips on a rough horizontal surface. At some instant it has linear velocity v_0 and angular velocity v_0 / 2R. Calculate the linear velocity after the sphere starts pure rolling.

(A) $3v_0 / 4$ forward (B) $4v_0 / 5$ forward (C) $3v_0 / 4$ backward (D) $4v_0 / 5$ backward

43. A block of base 10 cm × 10 cm and height 15 cm is kept on an inclined plane. The coefficient of friction between them is 0.3. The inclination θ of this inclined plane from the horizontal is gradually increased from 0°. Then:

(A) The block will start sliding before toppling

(B) The block will topple before sliding

(C) The block can't topple

(D) Can't say from given information

44. A thin and uniform rod of mass M and length L is held vertical on a floor with large friction. The rod is released from rest so that it falls by rotating about its contact-point with the floor without slipping. Which of the following statements is INCORRECT, when the rod makes an angle 60° with vertical?

Research

(A) The radial acceleration of the rod's center of mass will be

(B) The angular speed of the rod will be

(C) The angular acceleration of the rod will be

(D) The normal reaction force from the floor on the end will be

45. If an orbital electron of the hydrogen atom jumps from the ground state to a higher energy state, its orbital speed reduces to half its initial value. If the radius of the electron orbit in the ground state is r, then the radius of the new orbit will be:

(A) 2r (B) 4r

(C) 8r

(D) 16r

Mathematics					
46. On an algebra quiz, 10% of the students scored 70 points, 35% scored 80 points, 30% scored 90 points, and the rest scored 100 points. The difference between the mean and median score of the students' scores on this quiz is					
(A) 1 (B) 2 (C) 3 (D) 4					
47. The population of a city doubles in 50 years. In how many years will it triple under the assumption that the rate of increase is proportional to the number of inhabitants?					
 (A) 75 (B) 100 (C) 50 log₂ 3 (D) 50 log₃(3/2) 					
48. An urn contains 30 balls out of which one is special. If 6 of these balls are taken out at random, what is the probability that the special ball is chosen?					
(A) 1/30 (B) 1/6 (C) 1/15 (D) 1/5 (C) 1/15					
49. If A is a symmetric matrix of order 3 with only {–1, 0, 1} as its entries, then number of possible choices of A is					
(A) 3 ⁹ (B) 4 ³ (C) 6 ³ (D) 3 ⁶					
50. How many solutions does equation $tan(2x) = cos(x/2)$ have in the interval $[0, 2\pi]$?					
(A) 1 (B) 2 (C) 4 (D) 5					
51. The value of i + $2i^2$ + $3i^3$ + + 2002· i^{2002} is					
(A) -999 + 1002i (B) -1002 + 999i (C) -1001 + 1000i (D) -1002 + 1001i					
10					

52. Let f be a function such that $f(x/3) = x^2 + x + 1$. The sum of all values of z for which f(3z) = 7

(A) -1/3 (B) -1/9 (C) 0 (D) 5/9

53. Let $\alpha = \lambda a - (2a + b)$ and $\beta = \lambda(4a + 3b) - 2a$ be two given vectors, where a and b are non-collinear vectors. Find the value of λ for which the vectors α and β are collinear.

(A) -4 (B) -3 (C) 3 (D) 4

54. For how many values of p, the circle $x^2 + y^2 + 2x + 4y - p = 0$ and the coordinate axes have exactly three common points

- (A) 0 (B) 1
- (C) 2
- (D) More than 2

55. Considering only the principal values of inverse functions, the set A = {x : $x \ge 0$, $\tan^{-1}(2x) + \tan^{-1}(3x) = \pi/4$ }

Cracker

(A) Contains 2 elements

(B) Contains more than 2 elements

(C) Is a singleton set

(D) Is an empty set

56. If the sum of the distance of a point from two perpendicular lines in a plane is 1, then its locus is

- (A) square
- (B) circle

(C) straight lines

(D) 2 intersecting lines

57. The number of solutions to the equation $log_4(x - 1) = log_4(x - 3)$ is

- (A) 0
- (B) 1
- (C) 2
- (D) 4

58. Let be a real number. What is the total number of distinct points of intersection between the parabola and the pair of lines ?

(A) 1

(B) 4

(C) 0

(D) 2

59. Number of integer solutions to (1 - i)k = 2k

(A) 0 (B) 1 (C) 2 (D) more than 2

60. A hotel has 5 rooms, each with a distinctive color-coded decor. One day 5 friends arrive to spend the night. There are no other guests that night. The friends can room in any combination they wish, but with no more than 2 friends per room. In how many ways can the innkeeper assign the guests to the rooms?

(A) 210 (B) 2220 (C) 3000 (D) 3120



ANSWER KEY

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