RRB Group D Official Paper (Held On: 02 Feb, 2026 Shift 3) (Previous Year Paper)

RRB Group D • 2026 • 100 questions • 90 minutes • Answer key and solutions

Take this paper as a timed mock test

Practise under exam conditions, then review your answers after you submit.

yourmocktest.com/pyq/rrb-group-d/rrb-group-d-official-paper-held-on-02-feb-2026-shift-3-previ…

Scan the QR code or click the link to open it.

YourMockTest.com — Free Study Material

GENERAL SCIENCE

Q1. Which of the following statements suits best for the role of chemical methods of birth control in family planning?

(a) They alter the hormone levels to inhibit ovulation and uterus preparation.
(b) They increase estrogen levels to promote ovulation and make fertilisation less likely.
(c) They prevent sperm from entering the uterus by thickening the vaginal wall.
(d) They mechanically block the fallopian tubes and suppress menstruation entirely.

Q2. What is the correct formula for calculating pressure, where thrust is the force applied and area is the surface it acts on?

(a) Pressure = Area ÷ Thrust
(b) Pressure = Thrust + Area
(c) Pressure = Thrust ÷ Area
(d) Pressure = Thrust × Area

Q3. A particle accelerates uniformly at 2 m/s². Its velocity changes from 5 m/s to 15 m/s. How long does this take?

(a) 5 s
(b) 7s
(c) 2 s
(d) 10 s

Q4. Which of the following properties of 'suspension' is INCORRECT?

(a) Particles of suspension do not scatter a beam of light.
(b) Suspension is a heterogeneous mixture.
(c) Particles of suspension are visible to the naked eye.
(d) Particles of suspension can be separated from the mixtures by the process of filtration.

Q5. Which of the following combination reactions is an example of exothermic reaction?

(a) $CH_4(g) + 2O_2 \rightarrow CO_2(g) + 2H_2O$
(b) $2AgCl(s) \rightarrow$ (sunlight) $2Ag(s) + Cl_2(g)$
(c) $CaCO_3(s) \rightarrow$ (Heat) $CaO(s) + CO_2(g)$
(d) $Pb(s) + CuCl_2(aq) \rightarrow PbCl_2(aq) + Cu(s)$

Q6. What happens to the sound when the source vibrates faster?

(a) The frequency and pitch become higher.
(b) The pitch stays the same, but frequency decreases.
(c) The sound stops producing compressions and rarefactions.
(d) The frequency and pitch become lower.

Q7. At what pH does tooth decay begin to occur in the human mouth?

(a) Between 7 and 8
(b) Above 8
(c) Below 5.5
(d) Exactly 6.5

Q8. The absolute refractive index of a material is 4/3. If the speed of light in air is 3 × 10^8m/s, then what will be the speed of light in this medium?

(a) 4 x 10^8 m/s
(b) 1.33 x 10^8 m/s
(c) 2.25 x 10^8 m/s
(d) 3 x 10^8 m/s

Q9. Which of the following situations clearly illustrates Newton's third law, where action and reaction forces act on two different objects and are equal and opposite?

(a) A stone resting on the ground.
(b) A car accelerating due to engine power.
(c) A sailor pushes the boat backward while jumping forward, and the boat pushes him forward.
(d) A book kept on a table remains at rest.

Q10. Select the option that is true regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion (A): Vegetative propagation helps grow plants that do not produce seeds.

Reason (R): It uses flowers to grow new plants.

(a) Both A and R are true, but R is not the correct explanation of A
(b) Both A and R are true, and R is the correct explanation of A
(c) A is true, but R is false
(d) A is false, but R is true

Q11. The amount of solute dissolved in a particular solvent is defined in terms of:

(a) concentration
(b) fluidity
(c) viscosity
(d) surface tension

Q12. Water harvesting is important because it:

(a) Recharges groundwater
(b) Purifies the water bodies
(c) Decreases the water supply to downstream areas
(d) Reduces the mineral density in water bodies

Q13. When CO2 reacts with calcium hydroxide, it gives calcium carbonate and water. Which property of CO2 is seen in this reaction?

(a) Acidic property
(b) Basic property
(c) Oxidising property
(d) Neutral property

Q14. Why does a galvanised iron article remain protected from rusting even if the zinc coating is scratched?

(a) Zinc is more reactive than iron and undergoes preferential oxidation, protecting the iron.
(b) Iron forms a thin layer of rust that prevents further corrosion.
(c) Scratches allow oil to seep in and prevent rusting.
(d) Zinc reacts with iron to form a protective layer of iron oxide.

YourMockTest.com — Free Study Material

Q15. Prokaryotic cells differ from eukaryotic cells in having which of the following?

(a) Membrane-bound organelles
(b) No membrane-bound nucleus
(c) A true nucleus
(d) Ribosomes

Q16. Which of the following is NOT a property of ionic compounds?

(a) They generally have high melting and boiling points.
(b) They are generally solid at room temperature.
(c) They can conduct electricity in an aqueous/molten state.
(d) They are soluble in solvents such as kerosene and petrol.

Q17. A convex mirror always forms an image that is _____.

(a) virtual, erect, and diminished
(b) virtual, erect, and larger than the object
(c) real, inverted, and smaller than the object
(d) real, erect, and same size as the object

Q18. According to Ohm's law, the potential difference across a conductor is:

(a) equal to the resistance
(b) directly proportional to the current
(c) independent of the current
(d) inversely proportional to the current

Q19. The resistance of a wire is 1 Ω. If it is cut into two equal parts, the resistance of each part will be:

(a) 1 Ω
(b) 4 Ω
(c) 2 Ω
(d) 0.5 Ω

Q20. An object has a mass of 11 kg and is placed at a height above the ground. If its potential energy is 440 J and g = 10 m/s^2, what is the height?

(a) 2 m
(b) 48,400 m
(c) 4 m
(d) 8 m

Q21. Plastids have their own _____ and _____, similar to mitochondria.

(a) enzymes; vacuoles
(b) vesicles; proteins
(c) DNA; ribosomes
(d) nucleus; chromosomes

Q22. Which reaction best supports the Law of Conservation of Mass?

(a) Heating iron in open air
(b) Mixing of vinegar and baking soda in a sealed container
(c) Evaporation of alcohol in open air
(d) Burning of paper in open air

Q23. Which of the following is a result of the genetic variation introduced by sexual reproduction?

(a) Evolution
(b) Formation of identical twins
(c) Production of genetically identical offspring
(d) Decreased chances of survival

YourMockTest.com — Free Study Material

Q24. Which enzyme present in saliva helps break down starch?

(a) Lipase
(b) Amylase
(c) Pepsin
(d) Trypsin

Q25. Food web consists of different types of _____.

(a) food chains
(b) trophic levels
(c) foods
(d) ecosystems

MATHEMATICS

Q26. What is the LCM of 13, 65, and 91?

(a) 650
(b) 455
(c) 1825
(d) 5005

Q27. By how much is 60% of 45 greater than 1/5 of 55?

(a) 13
(b) 14
(c) 16
(d) 10

Q28. In a town with 75,000 voters, 95% cast their votes, all of which were valid. There were three candidates: A, B, and C. Candidate A received 40% of the valid votes, while candidate B received 12% fewer votes than A. What percentage of the valid votes did candidate C receive?

(a) 15.2%
(b) 24.8%
(c) 52%
(d) 48%

Q29. If P : 17 :: 42 : 6, then find the value of P.

(a) 119
(b) 118
(c) 122
(d) 116

Q30. During the festive season, one large laddoo having radius 32 cm is made as prashad. After pooja, it is decided to make small laddoos from one large laddoo so as to distribute to the devotees. How many laddoos of radius 2 cm can be made?

(a) 4132
(b) 3896
(c) 3964
(d) 4096

Q31. A person saves 10% of his income. If his expenditure is Rs. 360, then his income (in Rs.) is:

(a) 36
(b) 440
(c) 400
(d) 324

YourMockTest.com — Free Study Material

Q32. The value of the expression $(1.1^2 - 0.9^2)/(0.011^2 - 0.009^2) \times 0.1^2$ is _____.

(a) 0.1
(b) 100
(c) 1
(d) 10

Q33. Two trains are running in opposite directions at the same speed. If the length of each train is 444 m and they cross each other in 37 seconds, then what is the speed of each train?

(a) 8 m/s
(b) 10 m/s
(c) 9 m/s
(d) 12 m/s

Q34. Find the effective price percentage of the marked price after three consecutive discounts of 11%, 18% and 20% (rounded off to two decimal places).

(a) 62.14%
(b) 58.38%
(c) 58.88%
(d) 61.4%

Q35. The mode of the observations 22, 21, 22, 20, 33, 34, 22, 29, 29, 31, 23, 23, 28, 32, 22, 26 and 27 is:

(a) 22
(b) 20
(c) 33
(d) 21

Q36. The average of first 6 odd natural numbers, is:

(a) 5.5
(b) 7
(c) 6.5
(d) 6

Q37. Find the value of {(25 × 4^(-4))/(5^(-3) × 10 × 4^(-8))} ÷ {(3^(-5) × 10^(-5) × 125)/(5^(-7) × 6^(-5))}.

(a) 73/4
(b) 128/5
(c) 89/6
(d) 149/9

Q38. A man bought some oranges at the rate of 10 for Rs. 300 and sold them at the rate of 5 for Rs. 175. What is his profit percentage (correct to two decimal places)?

(a) 16.67%
(b) 14.67%
(c) 15.67%
(d) 18.67%

Q39. In triangle ABC, BD perpendicular to AC at D and angle DBC = 66°. E is a point on BC such that angle CAE = 35°. What is the measure of angle AEB ?

(a) 66°
(b) 47°
(c) 65°
(d) 59°

YourMockTest.com — Free Study Material

Q40. X, Y and Z together can complete a piece of work in 8 days, while X alone can complete it in 24 days and Y alone can complete it in 36 days. Find in how many days Z alone can complete the work?

(a) 28 days
(b) 12 days
(c) 48 days
(d) 18 days

Q41. The volume of a sphere is numerically equal to its surface area. Find its radius (in units).

(a) 5
(b) 3
(c) 4
(d) 6

Q42. If 4 lines of a print, in a column of a book, contain 36 words, how many words will a column of 50 lines contain?

(a) 450
(b) 446
(c) 460
(d) 454

Q43. A dealer marks his goods at 25% above the cost price and allows a discount of 28% on the marked price. What is his gain or loss percentage?

(a) 10% loss
(b) 7% gain
(c) 8% loss
(d) 11% loss

Q44. Rahul covers a distance of 225 km in 15 hours. How many hours will he take to cover 40% less distance if he drives 20% faster than his original speed?

(a) 7.5
(b) 8
(c) 7
(d) 8.5

Q45. Find the simple interest (in Rs.) on Rs. 4,000 at 6% per annum rate of interest for the period from 22 February 2024 to 23 April 2024.

(a) 41
(b) 38
(c) 39
(d) 40

Q46. A computer printed 1,76,400 lines in a given day. If the printer was in operation for 6 hours during the day, how many lines did it print per minute?

(a) 420
(b) 450
(c) 460
(d) 490

Q47. A, B and C can do a piece of work in 3, 9 and 18 days, respectively. How long (in days) will they take to do twice the same work, working together?

(a) 8
(b) 4
(c) 12
(d) 5

YourMockTest.com — Free Study Material

Q48. The difference between the present ages of two sisters is 3 years. After 2 years, the elder sister will be twice as old as the younger sister was 2 years ago. Find the sum of their ages after 8 years from now.

(a) 37 years
(b) 31 years
(c) 39 years
(d) 33 years

Q49. A vertical stick 15 m long casts a shadow 5 m long on the ground. At the same time, a tower casts a shadow of 46.5 m long on the ground. The height of the tower is:

(a) 139.5 m
(b) 141.5 m
(c) 135.5 m
(d) 137.5 m

Q50. The ratio of three numbers is 12 : 21 : 5. If 50 percent of the first number is 78, then what would be 50 percent of the absolute difference of third and second number?

(a) 102
(b) 104
(c) 105
(d) 103

GENERAL INTELLIGENCE & REASONING

Q51. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements:

All bags are shoes.

All bags are caps.

All bags are laptops.

Conclusions:

(I): All shoes are laptops.

(II): Some laptops are caps.

(a) Only conclusion (II) follows
(b) Only conclusion (I) follows
(c) Neither conclusion (I) nor (II) follows
(d) Both conclusions (I) and (II) follow

Q52. All 46 people are standing in a row facing north. Z is 12^(th) from the right end while G is 9^(th) from the left end. How many people are there between Z and G?

(a) 25
(b) 23
(c) 24
(d) 21

Q53. YEVA is related to JPGL in a certain way based on the English alphabetical order. In the same way, QWNS is related to BHYD. To which of the given options is XDUZ related, following the same logic?

(a) IOFK
(b) FOKI
(c) FIKO
(d) IOFJ

YourMockTest.com — Free Study Material

Q54. Select the pair which follows the same pattern as that followed by the two pairs given below. Both pairs follow the same pattern.

PSQ−MPN

GJH−DGE

(a) TVS−PSQ
(b) TVS−QTR
(c) TWU−QTR
(d) TWU−PTQ

Q55. Based on the English alphabetical order, three of the following four are alike in a certain way and thus form a group. Which is the one that does not belong to that group?

(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) YBG
(b) ILQ
(c) CFK
(d) JMQ

Q56. A, B, C, D, E and F are sitting around a circular table, facing the centre. D sits third to the right of C. A sits second to the left of C. E sits second to the right of F. B sits to the immediate right of E. How many people sit between A and F, when counted from the left of A?

(a) Two
(b) Four
(c) One
(d) None

Q57. Which of the following letter-clusters will replace the question mark (?) in the given series to make it logically complete?

KDG, MFI, OHK, QJM, ?

(a) SKP
(b) SLP
(c) SKO
(d) SLO

Q58. Five people, A, B, C, D and E, are sitting in a row, facing towards the north. Only two people are sitting between A and D. B is sitting at the third position from the extreme left of the row. B is sitting to the immediate right of A. B is sitting to the immediate left of E. Exactly how many people are sitting between E and A?

(a) Two
(b) Three
(c) None
(d) One

Q59. In a certain code language, ‘AUTO’ is coded as ‘2683’ and ‘TOUR’ is coded as ‘8136’. What is the code for ‘R’ in that language?

(a) 6
(b) 8
(c) 1
(d) 3

Q60. What should come in place of the question mark (?) in the given series?

1 5 11 19 ? 41

(a) 29
(b) 30
(c) 27
(d) 28

YourMockTest.com — Free Study Material

Q61. Refer to the given number, symbol series and answer the question that follows. Counting to be done from left to right only.

(Left) 4 8 @ 3 € 8 & 6 * 6 © 6 $ £ & 5 7 $ $ # 8 $ (Right)

How many such numbers are there, each of which is immediately preceded by a symbol and also immediately followed by a symbol?

(a) 6
(b) 8
(c) 7
(d) 5

Q62. Refer to the given number series and answer the question that follows (all numbers are single-digit numbers only). Counting to be done from left to right only.

(Left) 4 2 1 5 7 9 8 5 3 6 2 1 5 7 3 7 8 4 3 6 9 7 4 5 2 4 1 (Right)

How many such even digits are there, each of which is immediately preceded by an even digit and also immediately followed by an odd digit?

(a) Three
(b) More than three
(c) Two
(d) One

Q63. Vikas starts from Point Y and drives 81 km towards the south. He then takes a right and drives 77 km. He then takes a right turn and drives 27 km. He takes a right turn, drives 35 km. He then turns right, drives 39 km, turns left and drives 42 km to stop at Point Z. How far (shortest distance) and towards which direction should he drive in order to reach Point Y again? (All turns are 90-degree turns only unless specified.)

(a) 93 km towards the north
(b) 89 km towards the north
(c) 97 km towards the south
(d) 94 km towards the south

Q64. Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

CYB 48 DZC 53 EAD 58 FBE 63 ?

(a) GHJ 67
(b) GBE 67
(c) GCF 68
(d) GDE 68

Q65. If ‘A’ stands for ‘÷’, ‘B’ stands for ‘×’, ‘C’ stands for ‘+’ and ‘D’ stands for ‘−’, what will come in place of the question mark (?) in the following equation?

(84 A 12) B 5 C 13 B 2 D 11 B 5 C 28 = ?

(a) 54
(b) 49
(c) 27
(d) 34

Q66. Select the set in which the numbers are related in the same way as are the numbers of the following sets.

(NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into their constituent digits. E.g. 13 – Operations on 13 such as adding to/subtracting from/multiplying with 13 can be performed. Breaking down 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not allowed.)

(5, 14, 25)

(4, 13, 24)

(a) (8, 17, 6)
(b) (6, 15, 26)
(c) (10, 31, 42)

YourMockTest.com – Free Study Material

(d) (9, 18, 23)

Q67. Each of the digits in the number 21786539 is arranged in ascending order from left to right. The position(s) of how many digits will remain unchanged as compared to that in the original number?

(a) None
(b) One
(c) Two
(d) Three

Q68. What should come in place of the question mark (?) in the given series?

6 8 ? 18 26 36

(a) 11
(b) 13
(c) 14
(d) 12

Q69. All 54 people are standing in a row facing north. Mr. Akte is 8^(th) from the right end while Mr. Memi is 21^(st) from the left end. How many people are there between Mr. Akte and Mr. Memi?

(a) 25
(b) 26
(c) 24
(d) 23

Q70. In a certain code language,

P + Q means ‘P is the husband of Q’,

P # Q means ‘P is the brother of Q’,

P & Q means ‘P is the mother of Q’ and

P % Q means ‘P is the sister of Q’.

How is F related to E if ‘F # N + O & V % E’?

(a) Father's sister
(b) Sister's son
(c) Father's brother
(d) Sister's husband

Q71. Read the given statement(s) and conclusions carefully. Assuming that the information given in the statements is true, even if it appears to be at variance with commonly known facts, decide which of the given conclusions logically follow(s) from the statements.

Statements: Some Hydrogens are Oxygens. All Oxygens are Nitrogens. All Nitrogens are Carbons.

Conclusion I: All Oxygens are Carbons.

Conclusion II: Some Nitrogens are Hydrogens.

(a) Only Conclusion II follows
(b) Neither Conclusion I nor II follows
(c) Both Conclusions I and II follow
(d) Only Conclusion I follows

Q72. Kartik starts from Point A and drives 9 km towards east. He then takes a right turn, drives 5 km, turns right and drives 11 km. He then takes a right turn and drives 12 km. He takes a final right turn, drives 2 km and stops at Point P. How far (shortest distance) and towards which direction should he drive in order to reach Point A again?

(Note: All turns are 90° turns only unless specified.)

(a) 6 km to the south
(b) 6 km to the north
(c) 7 km to the north
(d) 7 km to the south

YourMockTest.com — Free Study Material

Q73. Based on the English alphabetical order, three of the following four letter-cluster pairs are alike in a certain way and thus form a group. Which is the letter-cluster pair that DOES NOT belong to that group?

(Note: The odd one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) SQ−MK
(b) CA−WU
(c) MK−GE
(d) GE−ZA

Q74. JTUB is related to HRSZ in a certain way based on the English alphabetical order. In the same way, MXNP is related to KVLN. To which of the given options is LRYH related, following the same logic?

(a) JPXF
(b) KQXG
(c) JPWF
(d) IOVE

Q75. In a certain code language, ‘go there now’ is coded as ‘lb gt de’ and ‘go to school’ is coded as ‘kj ft de’. How is ‘go’ coded in the given language?

(All codes are two-letter codes)

(a) kj
(b) de
(c) gt
(d) lf

Q76. Seven friends, L, M, N, O, Q, R and S, are sitting in a straight line facing north. No one sits to the right of S. S sits immediately to the right of Q. Only three people sit between S and N. R sits third to the left of M. O sits to the immediate right of M. How many people sit between L and Q?

(a) One
(b) Zero
(c) Two
(d) Three

Q77. Refer to the following letter series and answer the question. (Counting to be done from left to right only.)

(Left) D M X A G N R L W O T P Y E F Q K Z J V U H (Right)

How many such consonants are there, each of which is immediately preceded by a consonant and also immediately followed by a vowel?

(a) Two
(b) One
(c) More than three
(d) Three

Q78. What should come in place of the question mark (?) in the given series?

17, 22, 32, 47, 67, ?

(a) 91
(b) 93
(c) 94
(d) 92

Q79. This question is based on the five, three-digit numbers given below.

(Left) 654 842 684 714 385 (Right)

(Example: 697 – First digit = 6, second digit = 9 and third digit = 7)

(NOTE: All operations to be done from left to right.)

If all the numbers are arranged in ascending order, then the position of how many numbers will remain unchanged?

(a) One
(b) Two

YourMockTest.com — Free Study Material

(c) Three
(d) Four

Q80. If 'A' stands for '÷', 'B' stands for '×', 'C' stands for '+' and 'D' stands for '−', then what will come in place of the question mark (?) in the following equation?

12 C 52 A 13 B 7 D 31 = ?

(a) 7
(b) 5
(c) 8
(d) 9

GENERAL AWARENESS AND CURRENT AFFAIRS

Q81. What was the theme of the National Disaster Management Authority (NDMA)'s 21st Formation Day, observed on 26 September 2025?

(a) Technology for Risk Reduction – For a Safer Nation
(b) Stopping Impact of Disaster Incidents in the Himalayan Region
(c) Empowering Communities for Disaster Risk Reduction Through Awareness
(d) Volunteerism in Disaster Management

Q82. Where will India's first electronic waste (e-waste) eco-park be established by the Delhi government as a model for sustainable urban development?

(a) Holambi Kalan
(b) Anand Vihar
(c) Rohini
(d) Dwarka

Q83. Which among the following states was ranked first in the NITI Aayog's Fiscal Health Index (FHI) 2025 for the financial year 2022-23?

(a) Karnataka
(b) Odisha
(c) Maharashtra
(d) Gujarat

Q84. On 11 March 2025, Finance Minister Nirmala Sitharaman announced a corpus of how much for a contingency fund in Manipur during the discussion on the 'Manipur Appropriation Bill, 2025' and 'The Manipur Appropriation (Vote on Account) Bill, 2025' in the Lok Sabha?

(a) Rs. 600 crore
(b) Rs. 500 crore
(c) Rs. 400 crore
(d) Rs. 750 crore

Q85. In June 2025, which of the following organizations published the Global Economic Prospects (GEP) report, a flagship publication providing analysis of global economic trends, forecasts, and risks?

(a) International Monetary Fund
(b) Asian Development Bank
(c) World Economic Forum
(d) World Bank Group

Q86. Which summit involving regional leaders from East and Southeast Asia was held in Kuala Lumpur, Malaysia, on 26–27 May 2025?

(a) East Asia Summit
(b) Indo-Pacific Strategic Forum
(c) ASEAN-China Summit
(d) Asia-Pacific Economic Cooperation Summit

YourMockTest.com – Free Study Material

Q87. According to the World Bank's Poverty and Equity Brief Report 2025, India’s extreme poverty rate fell from 16.2% (in 2011-12) to what percentage in 2022-23?

(a) 3.2%
(b) 2.3%
(c) 1.8%
(d) 2.8%

Q88. Which of the following villages in the Uttarkashi district of Uttarakhand was devastated by a flash flood caused by a cloudburst on 5 August 2025?

(a) Dharali
(b) Pangot
(c) Kanatal
(d) Bhowali

Q89. Where were the Special Olympics World Winter Games 2025 held?

(a) Iceland
(b) Canada
(c) Italy
(d) China

Q90. Why the Constitution Matters' is a book written by _____.

(a) D.Y. Chandrachud
(b) Natwar Singh
(c) Bibek Debroy
(d) Arif Khan

Q91. In which track event did Animesh Kujur break his own national record?

(a) 100 m
(b) 800 m
(c) 200 m
(d) 400 m

Q92. Which organisation confirmed strong economic growth in India’s industrial and services sectors in May 2025, despite unemployment challenges?

(a) Ministry of Finance
(b) NITI Aayog
(c) World Bank
(d) Reserve Bank of India

Q93. The Defence Research and Development Organisation (DRDO) flight-tested the Integrated Air Defence Weapon System (IADWS) in August 2025. Which of the following DRDO laboratories developed the high-power laser-based Directed Energy Weapon (DEW) for the Integrated Air Defence Weapon System (IADWS)?

(a) Defence Research and Development Laboratory
(b) Research Centre Imarat
(c) Defence Research and Development Establishment
(d) Centre for High Energy Systems and Sciences

Q94. In September 2025, which female cheetah was released in Gandhi Sagar Wildlife Sanctuary to strengthen breeding efforts?

(a) Namib
(b) Sasha
(c) Aasha
(d) Dheera

YourMockTest.com — Free Study Material

Q95. What type of weapon is DRDO planning to test under the DURGA-2 project?

(a) Laser Weapon
(b) Biological Agent
(c) Hypersonic Missile
(d) Plasma Gun

Q96. The Fit India Movement's 'Sundays on Cycle' event, aimed at promoting a healthy lifestyle, was held in February 2025. At which iconic Mumbai landmark did it take place?

(a) Gateway of India
(b) Marine Drive
(c) Chhatrapati Shivaji Maharaj Terminus
(d) Bandra-Worli Sea Link

Q97. In October 2025, what was the RBI Monetary Policy Committee' s decision on the policy repo rate and stance?

(a) Hiked to 5.75% and turned 'hawkish' stance
(b) Held at 5.90% with an 'accommodative' stance
(c) Held at 5.50% and maintained a 'neutral' stance
(d) Cut to 5.25% and shifted to 'accommodative' stance

Q98. As of July 2025, how many Indian cricketers have been nominated for a Laureus World Sports Award, including Rishabh Pant?

(a) Four
(b) Two
(c) Three
(d) One

Q99. What action did the Securities and Exchange Board of India (SEBI) take on 22 August 2025 regarding social-media financial schemes?

(a) Ban all financial content on social media
(b) Create a retail investor compensation fund
(c) Issue advisory against FPI-linked schemes
(d) Grant registration to finance influencers

Q100. Which milestone did Tata Lockheed Martin Aerostructures (TLMAL), a joint venture of Tata Advanced Systems (TASL) and Lockheed Martin achieve in India’s defence manufacturing in December 2025?

(a) Delivery of 200th C-130J tail assembly
(b) Delivery of 250th C-130J tail assembly
(c) Delivery of 100th C-130J tail assembly
(d) Delivery of 300th C-130J tail assembly

ANSWER KEY

1	a	2	c	3	a	4	a	5	a	6	a	7	c	8	c	9	c	10	c
11	a	12	a	13	a	14	a	15	b	16	d	17	a	18	b	19	d	20	c
21	c	22	b	23	a	24	b	25	a	26	b	27	c	28	b	29	a	30	d
31	c	32	b	33	d	34	b	35	a	36	d	37	b	38	a	39	d	40	d
41	b	42	a	43	a	44	a	45	d	46	d	47	b	48	a	49	a	50	b
51	a	52	a	53	a	54	c	55	d	56	b	57	d	58	d	59	c	60	a
61	a	62	b	63	a	64	c	65	d	66	b	67	c	68	d	69	a	70	c
71	c	72	d	73	d	74	c	75	b	76	d	77	c	78	d	79	b	80	d
81	a	82	a	83	b	84	b	85	d	86	c	87	b	88	a	89	c	90	a
91	c	92	d	93	d	94	d	95	a	96	a	97	c	98	b	99	c	100	b

YourMockTest.com — Free Study Material

SOLUTIONS

Q1. Answer: (a) They alter the hormone levels to inhibit ovulation and uterus preparation.

The correct answer is They alter the hormone levels to inhibit ovulation and uterus preparation.

Key Points

• Chemical methods of birth control, primarily known as hormonal contraceptives, work by interfering with the body's natural reproductive cycle using synthetic hormones like progestogen or a combination of progestogen and estrogen.

• These hormones act on the pituitary gland to inhibit the secretion of Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH), which are essential for ovulation. Without the surge of these hormones, the ovaries do not release an egg. Hence, statement 1 is correct.

• In addition to preventing ovulation, chemical methods alter the quality of the endometrium (the lining of the uterus), making it thin and unreceptive for the implantation of a fertilized egg. Hence, statement 1 is correct.

• Chemical methods do not "promote" ovulation; instead, they maintain a steady level of hormones to trick the body into thinking it is already pregnant or to bypass the mid-cycle hormonal peak. Hence, statement 2 is incorrect.

• While some hormonal methods thicken the cervical mucus to prevent sperm transport, they do not "thicken the vaginal wall" to block entry. Hence, statement 3 is incorrect.

• Mechanical blocking of the fallopian tubes is a surgical method (Permanent method) known as Tubectomy, not a chemical one. Chemical methods generally do not aim to suppress menstruation entirely, though they may lighten the flow. Hence, statement 4 is incorrect.

Additional Information

• Oral Contraceptive Pills (OCPs):

• These are popular chemical methods taken orally. A famous example in India is Saheli, a non-steroidal oral pill developed by the Central Drug Research Institute (CDRI) in Lucknow.

• Unlike traditional pills that are taken daily, Saheli is a 'once-a-week' pill with very few side effects and a high contraceptive value.

• Intrauterine Devices (IUDs):

• These are devices inserted by doctors in the uterus through the vagina. They are categorized into non-medicated IUDs (e.g., Lippes loop), copper-releasing IUDs (e.g., CuT, Cu7, Multiload 375), and hormone-releasing IUDs (e.g., Progestasert, LNG-20).

• Hormone-releasing IUDs make the uterus unsuitable for implantation and the cervix hostile to the sperm.

• Barrier Methods:

• These prevent the physical meeting of ovum and sperm. Common examples include condoms, diaphragms, cervical caps, and vaults. Condoms also provide the additional benefit of protecting against STIs and AIDS.

• Surgical Methods (Sterilization):

• These are terminal methods to prevent any more pregnancies. In males, the procedure is called Vasectomy (small part of the vas deferens is removed or tied up). In females, it is Tubectomy (small part of the fallopian tube is removed or tied up).

Important Points

• Medical Termination of Pregnancy (MTP): Voluntary termination of pregnancy before full term is known as MTP or induced abortion. The Government of India legalized MTP in 1971 with strict conditions to avoid its misuse (like female foeticide).

• Family Planning Program: India was one of the first countries in the world to initiate action plans and programs at a national level to attain total reproductive health as a social goal. These programs, called 'Family Planning', were initiated in 1951.

• Emergency Contraceptives: Administration of progestogens or progestogen-estrogen combinations within 72 hours of coitus have been found to be very effective as emergency contraceptives to avoid possible pregnancy due to rape or casual unprotected intercourse.

Q2. Answer: (c) Pressure = Thrust ÷ Area

The correct answer is Pressure = Thrust ÷ Area.

Key Points

• Pressure is defined as the physical force exerted on an object per unit area. It is the ratio of thrust to the area over which that force is distributed.

• The mathematical formula for pressure is Pressure = Thrust / Area. This indicates that pressure is directly proportional to the magnitude of the thrust and inversely proportional to the surface area. Hence, the formula Pressure = Thrust ÷ Area is correct.

• Thrust is the total force acting perpendicularly on a surface. It is measured in Newtons (N).

• If the area is kept constant, an increase in thrust will lead to an increase in pressure. Conversely, if the thrust is kept constant, decreasing the area will significantly increase the pressure.

• This principle explains why a sharp needle (small area) can easily penetrate a surface compared to a blunt object (large area) when the same amount of force is applied.

YourMockTest.com — Free Study Material

Additional Information

• SI Unit: The standard unit of pressure is the Pascal (Pa), named after the French scientist Blaise Pascal. One Pascal is equal to one Newton per square meter (1 N/m²).

• Scalar Quantity: Pressure is a scalar quantity because it does not have a specific direction of its own, even though the force (thrust) acting on the surface is a vector quantity.

• Atmospheric Pressure: This is the pressure exerted by the weight of the atmosphere. At sea level, the standard atmospheric pressure is approximately 101,325 Pa or 1 atm.

• Applications in Daily Life:

• School Bags: They are provided with broad straps to increase the surface area, thereby reducing the pressure on the shoulders of the student.

• Tools: Cutting tools like knives and axes have very thin edges to reduce the area and maximize the pressure, allowing them to cut through materials easily.

• Foundations: The foundations of high-rise buildings are made wide to distribute the heavy weight (thrust) over a larger area, preventing the building from sinking into the ground.

Important Points

• Fluid Pressure: In liquids and gases, pressure acts in all directions. The pressure in a liquid increases with depth due to the weight of the liquid column above it. The formula for fluid pressure is P = h × d × g, where h is height, d is density, and g is acceleration due to gravity.

• Conversion Units: Apart from Pascal, other common units for pressure include bar, torr, and pounds per square inch (psi). For example, 1 bar is equal to 100,000 Pa.

• Relationship Summary:

• Higher Thrust + Same Area = Higher Pressure.

• Same Thrust + Smaller Area = Higher Pressure.

• Same Thrust + Larger Area = Lower Pressure.

Q3. Answer: (a) 5 s

The correct answer is 5 s.

Key Points

• The motion of the particle is a case of uniformly accelerated motion in a straight line, where the rate of change of velocity remains constant over time.

• The initial velocity (u) of the particle is given as 5 m/s, which is its speed at the start of the measured interval.

• The final velocity (v) reached by the particle is 15 m/s, indicating an increase in speed due to acceleration.

• The uniform acceleration (a) is specified as 2 m/s². This value represents that the particle's velocity increases by 2 meters per second for every one second of motion.

• To determine the time (t) taken for this change, we use the first equation of motion: v = u + at. By substituting the known values into the equation, we get 15 = 5 + (2 × t).

• Solving for t involves subtracting the initial velocity from the final velocity (15 - 5 = 10) and then dividing by the acceleration (10 / 2), resulting in 5 seconds. Hence, the correct option is 5 s.

Additional Information

• Equations of Motion: These equations, often attributed to the work of Sir Isaac Newton and Galileo, describe the relationship between displacement (s), velocity (v and u), acceleration (a), and time (t).

• First Equation: v = u + at (defines the velocity-time relationship).

• Second Equation: s = ut + 1/2 at² (defines the displacement-time relationship).

• Third Equation: v² = u² + 2as (defines the velocity-displacement relationship).

• Uniform Acceleration: This occurs when an object's velocity changes at a constant rate. In a velocity-time graph, uniform acceleration is represented by a straight line, and the slope of this line gives the numerical value of the acceleration.

• SI Units: In the International System of Units, velocity is measured in m/s (meters per second), acceleration in m/s² (meters per second squared), and time in s (seconds).

• Vector Nature: Both velocity and acceleration are vector quantities, meaning they possess both magnitude and direction. If the acceleration is in the opposite direction of the velocity, it is called retardation or deceleration.

Important Points

• Displacement Calculation: Using the time calculated (5 s), the displacement of the particle during this interval can also be found using the second equation of motion: s = (5 × 5) + 0.5 × 2 × (5²) = 25 + 25 = 50 meters.

• Average Velocity: For uniformly accelerated motion, the average velocity can be calculated as (u + v) / 2. In this case, (5 + 15) / 2 = 10 m/s. Multiplying this by the time (10 m/s × 5 s) also gives the displacement of 50 meters.

YourMockTest.com — Free Study Material

• Historical Context: The study of kinematics was revolutionized in the 17th century. Understanding these basic principles is essential for engineering, astrophysics, and mechanical design applications.

Q4. Answer: (a) Particles of suspension do not scatter a beam of light.

The correct answer is Particles of suspension do not scatter a beam of light.

Key Points

• A suspension is defined as a heterogeneous mixture in which the solute particles do not dissolve but remain suspended throughout the bulk of the medium. Hence, statement 2 is correct.

• The particles of a suspension are quite large, typically with a diameter greater than 1000 nanometers (or 1 micrometer). Due to this size, the particles are visible to the naked eye without the aid of a microscope. Hence, statement 3 is correct.

• Particles of a suspension scatter a beam of light passing through it, making the path of light visible. This phenomenon is known as the Tyndall Effect. Therefore, the claim that they do not scatter light is factually incorrect. It is important to note that if the suspension is left to stand and the particles settle, the mixture will no longer scatter light. Hence, statement 1 is incorrect.

• Due to their relatively large size, the particles of a suspension can be easily separated from the mixture by the physical process of filtration. When passed through a filter paper, the solid particles are trapped as residue while the liquid passes through. Hence, statement 4 is correct.

• A suspension is inherently unstable. If left undisturbed, the particles will eventually settle down at the bottom of the container due to the force of gravity.

Additional Information

• Types of Mixtures based on Particle Size:

• True Solution: A homogeneous mixture where the particle size is less than 1 nanometer (10^-^9 m). These particles do not scatter light and cannot be separated by filtration. An example is salt dissolved in water.

• Colloid: A heterogeneous mixture (though often appearing homogeneous) with particle sizes between 1 nm and 1000 nm. They show the Tyndall Effect but the particles do not settle down. Examples include milk, fog, and blood.

• Physical State of Suspension: In a typical suspension, the dispersed phase is a solid, while the dispersion medium can be a liquid or a gas.

• Common Examples: Some well-known examples of suspensions include chalk powder in water, muddy water, flour in water, and Milk of Magnesia (Magnesium hydroxide).

• Settling and Optical Properties: When the particles in a suspension settle (a process called sedimentation), the mixture loses its ability to scatter light because the large particles are no longer distributed throughout the medium to intercept the light beam.

Important Points

• Tyndall Effect: Named after the scientist John Tyndall, who first studied it in 1869. It is a critical test to distinguish between a true solution and a colloid or suspension.

• Separation Methods: While filtration works for suspensions, colloids require more specialized techniques like centrifugation because their particles pass through standard filter papers.

• Stability Comparison: True solutions are the most stable, followed by colloids, while suspensions are the least stable mixtures as they undergo phase separation over time.

Q5. Answer: (a) $CH_4(g) + 2O_2 \rightarrow CO_2(g) + 2H_2O$

The correct answer is $CH_4(g) + 2O_2 \rightarrow CO_2(g) + 2H_2O$.

Key Points

• Exothermic reactions are chemical reactions that release energy to the surroundings, usually in the form of heat or light. In these reactions, the total energy of the products is less than the total energy of the reactants.

• The reaction $CH_4(g) + 2O_2 \rightarrow CO_2(g) + 2H_2O$ represents the combustion of methane (the primary component of natural gas). This process releases a significant amount of thermal energy, making it a classic example of an exothermic reaction. Hence, statement 1 is correct.

• The reaction $2AgCl(s) \rightarrow 2Ag(s) + Cl_2(g)$ occurs in the presence of sunlight. It is a photochemical decomposition reaction where energy is absorbed from light to break the chemical bonds. Such reactions are endothermic. Hence, statement 2 is incorrect.

• The reaction $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$ is the thermal decomposition of calcium carbonate. This reaction requires the absorption of heat (energy) to proceed, classifying it as an endothermic reaction. Hence, statement 3 is incorrect.

• The reaction $Pb(s) + CuCl_2(aq) \rightarrow PbCl_2(aq) + Cu(s)$ is a single displacement reaction. In this reaction, the more reactive lead (Pb) displaces the less reactive copper (Cu) from its salt solution. It is not categorized as a primary example of an exothermic combination reaction. Hence, statement 4 is incorrect.

Additional Information

• Combination Reaction: This is a type of reaction where two or more reactants combine to form a single product. A common example is the burning of magnesium ribbon in air ($2Mg + O_2 \rightarrow 2MgO$), which is also exothermic.

• Respiration: It is a vital biological process considered an exothermic reaction. During respiration, glucose ($C_6H_{12}O_6$) reacts with

oxygen in the cells of our body to produce carbon dioxide, water, and energy.

• Endothermic Reaction: These reactions are the opposite of exothermic reactions, as they absorb energy from their surroundings. Most decomposition reactions (breaking down a compound) are endothermic because they require energy in the form of heat, light, or electricity.

• Enthalpy Change (ΔH): In chemistry, exothermic reactions are characterized by a negative enthalpy change (-ΔH), while endothermic reactions have a positive enthalpy change (+ΔH).

Important Points

• Practical Examples: Common exothermic processes include the decomposition of vegetable matter into compost and the neutralization reaction between an acid and a base.

• Activation Energy: Even exothermic reactions like the combustion of methane require an initial spark or activation energy to begin, but once started, they release enough energy to sustain the reaction.

• Photosynthesis: Unlike respiration, photosynthesis in plants is an endothermic process because it requires the absorption of solar energy to convert carbon dioxide and water into food.

Q6. Answer: (a) The frequency and pitch become higher.

The correct answer is The frequency and pitch become higher.

Key Points

• The frequency of a sound wave is directly determined by the rate at which the source of the sound vibrates. Frequency is defined as the number of oscillations or vibrations per unit of time.

• When a source vibrates faster, the number of vibrations per second increases, which directly leads to a higher frequency.

• Pitch is the human brain's perception of the frequency of sound. There is a direct proportional relationship between frequency and pitch: as the frequency increases, the pitch of the sound also increases, making the sound shriller. Hence, the statement that the frequency and pitch become higher is correct.

• Conversely, if the source vibrates slower, the frequency decreases, and the resulting pitch is lower, making the sound appear deeper or more "grave."

• It is important to note that the speed of sound in a specific medium at a constant temperature remains relatively constant, regardless of the change in frequency or pitch.

Additional Information

• Frequency and its Unit: The SI unit of frequency is the Hertz (Hz), named in honor of the physicist Heinrich Rudolf Hertz. One Hertz represents one vibration per second.

• Nature of Sound Waves: Sound travels as a longitudinal mechanical wave. It moves through a medium by creating regions of high pressure called compressions and regions of low pressure called rarefactions. As long as the source vibrates, these regions are produced; they do not stop just because the vibration speed changes.

• Amplitude vs. Frequency: While frequency determines pitch, the amplitude of the vibration determines the loudness or intensity of the sound. A higher amplitude results in a louder sound, whereas a higher frequency results in a higher pitch.

• Human Auditory Range: The typical range of hearing for a healthy human ear is between 20 Hz and 20,000 Hz. Frequencies below 20 Hz are termed infrasonic, and frequencies above 20,000 Hz (20 kHz) are termed ultrasonic.

Important Points

• Wavelength Relationship: According to the wave equation (Velocity = Frequency × Wavelength), if the velocity is constant, an increase in frequency (faster vibration) results in a decrease in wavelength.

• Examples in Nature: A bird produces a high-pitched sound because its vocal cords vibrate at a high frequency, whereas a lion's roar is low-pitched because the vibrations occur at a lower frequency, even though the roar is much louder due to higher amplitude.

• Factors Affecting Pitch: In musical instruments like a guitar, tightening the string increases the tension, causing it to vibrate faster when plucked, thereby producing a higher pitch. Similarly, in wind instruments like a flute, shortening the air column increases the frequency of vibration.

Q7. Answer: (c) Below 5.5

The correct answer is Below 5.5.

Key Points

• Tooth decay, also known as dental caries, begins when the pH level in the human mouth falls below 5.5. At this acidic level, the hard tissues of the teeth start to lose minerals.

• The mouth contains various bacteria that act on sugars and food particles remaining in the mouth after eating. These bacteria produce acids through the fermentation process, which lowers the local pH.

• Tooth enamel is primarily composed of calcium hydroxyapatite, which is a crystalline form of calcium phosphate. While it is the hardest substance in the human body and does not dissolve in water, it becomes vulnerable to corrosion in acidic environments.

• When the pH drops below 5.5, the process of demineralization occurs, where the acid dissolves the calcium and phosphate ions

from the enamel, leading to the formation of cavities over time.

• Hence, the correct answer is Below 5.5.

Additional Information

• The pH Scale:

• The pH scale measures how acidic or basic a substance is, ranging from 0 to 14. A pH of 7 is considered neutral.

• Values less than 7 indicate acidity, while values greater than 7 indicate alkalinity (basicity).

• The normal pH of saliva typically ranges between 6.2 and 7.6, maintaining a relatively neutral environment to protect the teeth.

• Role of Saliva:

• Saliva plays a crucial role in preventing decay by buffering acids. It contains bicarbonate ions that help neutralize the acid produced by bacteria.

• It also facilitates remineralization, where minerals like calcium and phosphate are redeposited into the enamel from the saliva.

• Bacterial Interaction:

• The primary bacterium responsible for tooth decay is Streptococcus mutans. It thrives on sucrose and produces lactic acid as a byproduct of metabolism.

Important Points

• Prevention Strategies:

• Cleaning the mouth after eating, especially after consuming sugary or starchy foods, helps remove the substrate for acid-producing bacteria.

• Using toothpaste, which is generally basic/alkaline in nature, helps neutralize excess acid and strengthens the enamel.

• Fluoride is often added to water and toothpaste because it reacts with hydroxyapatite to form fluorapatite, which is more resistant to acid attacks even at a lower pH.

• Critical pH Concept:

• The critical pH is the point at which the oral environment is undersaturated with mineral ions relative to the tooth surface. For enamel, this value is approximately 5.5, while for the root surface (dentin), it is higher, around 6.2 to 6.7.

Q8. Answer: (c) 2.25 x 10^8 m/s

The correct answer is 2.25 × 10^8 m/s.

Key Points

• The absolute refractive index (n) of a medium is given by:

n = Speed of light in vacuum (or air) ÷ Speed of light in the medium

• Given:

• Refractive index, n = 4/3

• Speed of light in air, c = 3 × 10^8 m/s

• Speed of light in the medium:

v = c ÷ n

= 3 × 10^8 ÷ (4/3)

= 3 × 10^8 × 3/4

= 9/4 × 10^8

= 2.25 × 10^8 m/s

• Hence, the correct answer is Option 3 – 2.25 × 10^8 m/s.

Additional Information

• Refractive Index: It is the ratio of the speed of light in vacuum to the speed of light in a given medium.

• A medium with a higher refractive index slows down light to a greater extent.

• While the speed and wavelength of light change when it enters another medium, its frequency remains unchanged.

Q9. Answer: (c) A sailor pushes the boat backward while jumping forward, and the boat pushes him forward.

The correct answer is A sailor pushes the boat backward while jumping forward, and the boat pushes him forward.

Key Points

• Newton’s Third Law of Motion, famously articulated by Sir Isaac Newton in 1687, states that for every action, there is an equal and opposite reaction.

• In the instance of a sailor jumping out of a boat, the sailor exerts a force on the boat to move away from it. This force is directed backward and is considered the action.

• According to the law, the boat simultaneously exerts an equal and opposite force on the sailor directed forward, which is the reaction. This reaction force is what actually propels the sailor forward onto the dock or land. Hence, statement 3 is correct.

YourMockTest.com — Free Study Material

• A critical feature illustrated here is that the action and reaction forces act on two different objects (the sailor and the boat). This prevents the forces from canceling each other out, resulting in the acceleration of both bodies in opposite directions.

• The movement of the boat backward as the sailor leaps forward is a classic demonstration of this reciprocal interaction, often referred to as the recoil effect.

Additional Information

• Newton's First Law (Law of Inertia):

• This law states that an object will remain at rest or in uniform motion unless acted upon by an external unbalanced force.

• A stone resting on the ground or a book kept on a table remains stationary because the gravitational force pulling it down is perfectly balanced by the normal force pushing up from the surface. Hence, statements 1 and 4 primarily illustrate equilibrium and the First Law.

• Newton's Second Law (Law of Acceleration):

• This law defines the relationship between force, mass, and acceleration, expressed by the formula Force = mass x acceleration.

• A car accelerating due to engine power demonstrates how the application of a net force results in a change in velocity over time. Hence, statement 2 is an application of the Second Law.

• Universal Applications of the Third Law:

• Rocket Propulsion: The rocket engine expels exhaust gases downward (action), and the gases push the rocket upward (reaction).

• Swimming: A swimmer pushes the water backward with their hands (action), and the water pushes the swimmer forward (reaction).

• Walking: When we walk, our feet push backward against the ground (action), and the ground pushes our feet forward (reaction), allowing movement.

Important Points

• Simultaneity: It is important to note that the action and reaction occur at the exact same instant; there is no time lag between them.

• Magnitude and Direction: The forces are mathematically equal in magnitude but exactly 180 degrees opposite in direction.

• Different Masses: Even though the forces are equal, the resulting accelerations can be very different. For example, if a stone falls toward the Earth, the stone pulls the Earth up with the same force the Earth pulls the stone down, but the Earth's immense mass makes its acceleration undetectable.

• Nature of Forces: Action-reaction pairs are always of the same type. If the action is a magnetic force, the reaction must also be a magnetic force.

Q10. Answer: (c) A is true, but R is false

The correct answer is A is true, but R is false.

Key Points

• Assertion (A): Vegetative propagation is a type of asexual reproduction where new plants are produced from the vegetative parts of the parent plant, such as roots, stems, and leaves. It is an essential method for cultivating plants that have lost the ability to produce seeds or produce non-viable seeds, such as banana, seedless grapes, rose, jasmine, and sugarcane. Hence, Assertion (A) is correct.

• Reason (R): In the process of vegetative propagation, new plants are derived from non-reproductive parts. Flowers, on the other hand, are the reproductive organs of a plant involved in sexual reproduction, which leads to the formation of fruits and seeds. Since vegetative propagation specifically bypasses the use of flowers and seeds to create offspring, the claim that it uses flowers is factually incorrect. Hence, Reason (R) is false.

• Vegetative propagation ensures that the daughter plants are genetically identical to the parent plant, effectively creating clones. This is beneficial for maintaining desirable traits in agriculture and horticulture.

• Plants grown through this method often flower and bear fruits much faster than those grown from seeds, providing a significant time advantage for farmers.

• Therefore, while the assertion correctly identifies a primary use of vegetative propagation, the reason provided is incorrect because flowers are the site of sexual reproduction, not vegetative propagation.

Additional Information

• Natural Methods of Vegetative Propagation:

• Roots: New plants emerge from adventitious buds on roots, as seen in sweet potato and dahlia.

• Stems: Tubers (like potato with "eyes"), rhizomes (like ginger and turmeric), and runners (like strawberry) are common examples of stem-based propagation.

• Leaves: Certain plants like Bryophyllum produce buds along the margins of their leaves. When these leaves fall on moist soil, the buds develop into independent new plants.

• Artificial Methods of Vegetative Propagation:

• Cutting: A part of the stem is cut and buried in the soil to grow a new plant, commonly used for money plants and roses.

• Grafting: Joining a scion (part of one plant) with a stock (rooted part of another plant) so they grow as a single plant, widely used in mango and apple cultivation.

• Layering: A branch is bent to the ground and covered with soil until it develops roots, used for jasmine and lemon.

• Tissue Culture: A modern biotechnological technique where cells or tissues are grown in a nutrient medium under sterile conditions to produce plantlets.

Important Points

• Advantages: It allows for the rapid multiplication of plants. It is the only way to multiply seedless varieties. It preserves the genetic purity (homozygosity) of a cultivar.

• Disadvantages: Because all offspring are clones, there is no genetic variation. This makes the entire population susceptible to the same diseases or environmental changes, which could lead to total crop failure.

• Evolutionary Context: Unlike sexual reproduction, which involves the fusion of gametes and promotes evolution through variation, vegetative propagation is a conservative process focused on stability.

Q11. Answer: (a) concentration

The correct answer is concentration.

Key Points

• The concentration of a solution is defined as the amount of solute present in a given quantity of solvent or solution. It describes the ratio of the components in a mixture.

• A solute is the substance that is being dissolved (usually present in a smaller amount), while a solvent is the medium in which the solute is dissolved (usually present in a larger amount).

• Concentration can be expressed qualitatively as dilute (low amount of solute) or concentrated (high amount of solute).

• Quantitatively, it is measured using various units such as Molarity, Molality, Normality, and Mole Fraction to provide precise data for chemical reactions.

• A saturated solution is one in which no more solute can be dissolved at a specific temperature and pressure, representing the maximum concentration possible under those conditions. Hence, the correct answer is concentration.

Additional Information

• Common Units of Concentration:

• Molarity (M): It is the number of moles of solute dissolved in one liter (1L) of solution. It is the most common unit used in laboratories.

• Molality (m): It is the number of moles of solute per kilogram (1kg) of solvent. This unit is preferred when studying properties involving temperature changes because mass does not change with temperature.

• Mass Percentage (% w/w): This represents the mass of the solute in 100 grams of the total solution.

• Parts Per Million (ppm): Used for extremely dilute solutions, such as measuring pollutants in water or air, representing one part of solute in one million parts of the solution.

• Factors Affecting Concentration:

• Solubility: The maximum amount of solute that can dissolve in a solvent at a specific temperature.

• Temperature: Generally, the solubility of solids in liquids increases with an increase in temperature, whereas the solubility of gases in liquids decreases.

• Pressure: Significant mostly for gaseous solutes, where Henry's Law states that solubility increases with increased pressure.

Important Points

• Fluidity: This refers to the ease with which a substance flows. It is the reciprocal of viscosity. While it describes a physical property of liquids and gases, it does not measure the amount of dissolved solute. Hence, statement 2 is incorrect.

• Viscosity: This is the measure of a fluid's resistance to flow or internal friction. For example, honey has a higher viscosity than water. While adding solute can change the viscosity of a liquid, viscosity itself is not the definition of the amount of solute. Hence, statement 3 is incorrect.

• Surface Tension: This is the property of the surface of a liquid that allows it to resist an external force, caused by the cohesive forces between liquid molecules. It is measured in Newtons per meter (N/m). Hence, statement 4 is incorrect.

• In industrial applications, maintaining the correct concentration is vital for the production of medicines, fertilizers, and food products to ensure safety and efficacy.

Q12. Answer: (a) Recharges groundwater

The correct answer is Recharges groundwater.

Key Points

• Water harvesting is the process of collecting, conveying, and storing rainwater for later use, rather than allowing it to run off.

• One of the most critical functions of water harvesting is that it recharges groundwater. It allows surface water to percolate into

the soil and reach the underground aquifers, thereby raising the water table. Hence, the correct answer is Recharges groundwater.

• By storing water during the monsoon or rainy season, it provides a reliable source of water during dry periods or droughts.

• It helps in reducing the velocity of runoff, which in turn prevents soil erosion and helps in the conservation of the topsoil layer.

• Water harvesting systems are essential for sustainable water management, especially in regions facing acute water scarcity or over-exploitation of borewells and tube wells.

Additional Information

• Components of Harvesting: A typical system consists of a catchment area (usually rooftops or open ground), conveyance pipes, and storage structures like tanks or recharge pits.

• Rooftop Rainwater Harvesting: This involves collecting rain falling on the roofs of buildings. It is a highly effective decentralized method used in urban areas to meet domestic water needs.

• Surface Runoff Harvesting: In rural areas, rainwater flowing as surface runoff is collected and used to recharge ponds, lakes, and check dams.

• Benefits for Agriculture: Water harvesting provides critical supplemental irrigation for crops, helping farmers maintain productivity even when rainfall is erratic.

• Environmental Impact: It reduces the load on stormwater drains, which minimizes the risk of urban flooding during heavy downpours.

Important Points

• Traditional Methods in India: Different regions have unique traditional harvesting structures, such as Khadins and Johads in Rajasthan, Bamboo drip irrigation in Meghalaya, and Eris (tanks) in Tamil Nadu.

• Legal Mandates: Tamil Nadu became the first state in India to make rooftop rainwater harvesting compulsory for every building in 2001. This initiative led to a significant rise in the groundwater level in Chennai within a few years.

• Quality Improvement: Rainwater is generally soft water with low mineral content. Harvesting it and injecting it into the ground helps in diluting the salinity and mineral density (like fluorides and nitrates) often found in deep groundwater.

• Economic Value: Implementing these systems reduces the operational cost of pumping water from deep underground and decreases the dependency on water tankers.

Q13. Answer: (a) Acidic property

The correct answer is Acidic property.

Key Points

• The reaction between Carbon dioxide (CO_2) and Calcium hydroxide ($Ca(OH)_2$) produces Calcium carbonate ($CaCO_3$) and Water (H_2O). The chemical equation for this process is: $CO_2 + Ca(OH)_2 \rightarrow CaCO_3 + H_2O$.

• In this chemical reaction, Calcium hydroxide is a known base (also called slaked lime). When it reacts with Carbon dioxide, it forms a salt (Calcium carbonate) and water.

• According to the fundamental principles of chemistry, a reaction that produces salt and water from a base involves an acid. This is known as a neutralization reaction.

• Since CO_2 reacts with a base to form salt and water, it is classified as an acidic oxide. Non-metallic oxides, such as Carbon dioxide, generally exhibit acidic properties when they interact with bases or dissolve in water. Hence, the property seen in this reaction is acidic.

• This specific reaction is also the basis for the "limewater test" used to detect the presence of CO_2, where the formation of Calcium carbonate causes the solution to turn milky due to the white precipitate.

Additional Information

• Nature of Oxides:

• Acidic Oxides: These are typically non-metallic oxides like SO_2, NO_2, and CO_2. When dissolved in water, they form acids (e.g., CO_2 forms Carbonic acid, H_2CO_3).

• Basic Oxides: These are usually metallic oxides such as Sodium oxide (Na_2O) or Magnesium oxide (MgO). They react with acids to form salt and water.

• Amphoteric Oxides: These oxides, such as Aluminum oxide (Al_2O_3) and Zinc oxide (ZnO), can react with both acids and bases to produce salt and water.

• Neutral Oxides: Some oxides do not exhibit either acidic or basic properties and do not react with acids or bases, such as Carbon monoxide (CO) and Nitrous oxide (N_2O).

• Neutralization Reaction:

• It is a chemical reaction where an acid and a base react quantitatively with each other.

• The pH of the resulting solution depends on the strength of the reactants.

• In the given context, CO_2 acts as the acidic component reacting with the basic Calcium hydroxide.

• Industrial and Biological Importance:

• The reaction of CO_2 with Calcium hydroxide is used in softening water and in the manufacture of bleaching powder.

• In biology, the acidic nature of CO_2 is crucial in maintaining the pH balance of human blood through the bicarbonate buffer system.

Important Points

• Physical State: In this reaction, Calcium hydroxide is usually used as an aqueous solution (limewater), while Carbon dioxide is a gas.

• Observation: The Calcium carbonate formed is insoluble in water, which results in the turbidity or milkiness observed during the experiment.

• Excess CO_2: If Carbon dioxide is passed in excess through the solution, the milkiness disappears due to the formation of soluble Calcium bicarbonate [$Ca(HCO_3)_2$].

• Oxidizing vs. Reducing: While CO_2 can participate in redox reactions under extreme conditions, the reaction with Calcium hydroxide is strictly a neutralization (acid-base) reaction and not an oxidizing or neutral property manifestation.

Q14. Answer: (a) Zinc is more reactive than iron and undergoes preferential oxidation, protecting the iron.

The correct answer is Zinc is more reactive than iron and undergoes preferential oxidation, protecting the iron.

Key Points

• Galvanization is a chemical process used to protect iron and steel from corrosion or rusting by applying a thin protective layer of Zinc.

• The primary reason for this protection is that Zinc is more chemically reactive than iron. In the reactivity series of metals, zinc occupies a higher position than iron, making it more prone to oxidation.

• When a galvanized article is scratched or the coating is broken, the iron underneath is exposed to the atmosphere. However, because zinc is more electropositive, it acts as a sacrificial anode.

• In an electrochemical sense, a galvanic cell is formed where zinc loses electrons (oxidizes) preferentially over iron. These electrons flow to the iron, preventing it from being oxidized to ferrous ions. Hence, statement 1 is correct.

• The preferential oxidation of zinc leads to the formation of Zinc Oxide or Basic Zinc Carbonate, which further seals the surface, whereas iron rust (Ferric Oxide) is brittle and porous. Hence, statement 2 is incorrect as iron rust does not prevent further corrosion.

Additional Information

• Sacrificial Protection: This is a technique where a more active metal is used to protect a less active metal. Besides galvanization, this principle is used in ships and underground pipelines where blocks of Magnesium or Zinc are attached to the steel structure to prevent it from rusting.

• Mechanism of Rusting: Rusting is an electrochemical phenomenon. In the presence of moisture and oxygen, iron undergoes a redox reaction to form Hydrated Ferric Oxide ($Fe_2O_3 \cdot xH_2O$). Unlike the protective layer on aluminium or zinc, rust is non-adherent and allows air and water to reach the metal beneath, leading to total degradation.

• Standard Reduction Potential: The standard electrode potential of Zinc (Zn^{2+}/Zn) is approximately -0.76 V, while for Iron (Fe^{2+}/Fe) it is -0.44 V. The more negative value for Zinc indicates it is more easily oxidized than Iron.

• Methods of Prevention:

• Alloying: Mixing iron with Chromium and Nickel to create Stainless Steel.

• Barrier Protection: Painting, greasing, or oiling the surface to prevent contact with air and water. However, unlike galvanization, once these barriers are scratched, the iron begins to rust immediately.

Important Points

• Date and History: The term "Galvanization" is named after the Italian scientist Luigi Galvani. The Hot-dip galvanizing process was first patented by Stanislas Sorel in 1837.

• Industrial Use: It is widely used in construction, automobile manufacturing, and for utility poles and nails. The longevity of galvanized steel can exceed 50 years in rural environments and 20 to 25 years in severe urban or coastal settings.

• Zinc Consumption: Approximately 50% of the world's Zinc production is used for the galvanizing process to protect steel from the environment.

Q15. Answer: (b) No membrane-bound nucleus

The correct answer is No membrane-bound nucleus.

Key Points

• Prokaryotic cells are defined by the absence of a well-defined nucleus. Their genetic material (DNA) is not enclosed by a nuclear membrane, which is the most fundamental difference between them and eukaryotic cells.

• In these cells, the DNA is found in an irregularly shaped region called the nucleoid. Unlike the true nucleus of eukaryotes, the nucleoid lacks a protective envelope.

• Another distinguishing feature is the lack of membrane-bound organelles. Prokaryotic cells do not contain structures like

YourMockTest.com — Free Study Material

mitochondria, chloroplasts, lysosomes, or the Golgi apparatus. Hence, option 1 is a characteristic eukaryotes have but prokaryotes lack.

• While prokaryotes lack a membrane-bound nucleus, they do possess ribosomes for protein synthesis. However, prokaryotic ribosomes are smaller, designated as 70S, whereas eukaryotic ribosomes are generally 80S. Hence, statement 4 is a commonality, not a difference in the context of "having" something unique or lacking.

• The term prokaryote is derived from the Greek words 'pro' (meaning before) and 'karyon' (meaning kernel or nucleus), reflecting their evolutionary status as organisms that existed before the evolution of a true nucleus.

Additional Information

• Organism Types and Domains:

• Prokaryotes comprise two primary domains of life: Bacteria and Archaea. These are almost exclusively unicellular organisms.

• Eukaryotes belong to the domain Eukarya and include Protists, Fungi, Plants, and Animals. These can be either unicellular or multicellular.

• Size and Complexity:

• Prokaryotic cells are significantly smaller, typically ranging from 0.1 to 5.0 micrometers (µm) in diameter. This small size allows for a high surface-area-to-volume ratio, facilitating rapid nutrient diffusion.

• Eukaryotic cells are much larger and more complex, usually ranging from 10 to 100 µm. They require specialized organelles to manage cellular metabolism efficiently.

• Genetic Material and Replication:

• In prokaryotes, the genomic DNA is usually a single, circular chromosome. They may also possess small, extrachromosomal DNA loops called plasmids.

• Eukaryotes have multiple, linear chromosomes stored within the nucleus, associated with histone proteins for packaging.

• Prokaryotes reproduce through binary fission, a simple and rapid form of asexual reproduction. Eukaryotes utilize more complex processes like mitosis (for growth) and meiosis (for sexual reproduction).

• Cell Wall Composition:

• Most prokaryotes have a chemically complex cell wall. In bacteria, this wall is primarily composed of peptidoglycan.

• If eukaryotic cells have walls (such as in plants or fungi), they are chemically simpler, made of cellulose or chitin, respectively. Animal cells entirely lack a cell wall.

Important Points

• Cytoplasmic Differences: In prokaryotes, all metabolic processes occur directly in the cytoplasm because of the absence of compartmentalization. In eukaryotes, different functions are partitioned into different organelles.

• Flagella Structure: While both may have flagella for movement, prokaryotic flagella are made of the protein flagellin and move in a rotary fashion, whereas eukaryotic flagella are composed of microtubules and move in a whip-like motion.

• Evolutionary Timeline: Prokaryotes are among the earliest forms of life on Earth, appearing approximately 3.5 to 3.8 billion years ago. Eukaryotes appeared much later, roughly 1.5 to 2 billion years ago, likely through endosymbiosis.

Q16. Answer: (d) They are soluble in solvents such as kerosene and petrol.

The correct answer is They are soluble in solvents such as kerosene and petrol.

Key Points

• Melting and Boiling Points: Ionic compounds possess high melting and boiling points. This is due to the presence of a very strong electrostatic force of attraction between the positively charged ions (cations) and negatively charged ions (anions), which requires a significant amount of thermal energy to overcome. Hence, statement 1 is a correct property.

• Physical Nature: These compounds are solids and are somewhat hard at room temperature because of the strong force of attraction between the ions. They are generally brittle and tend to break into pieces when pressure is applied. Hence, statement 2 is a correct property.

• Electrical Conductivity: The conduction of electricity through a solution involves the movement of charged particles. Ionic compounds conduct electricity in the molten state or when dissolved in water (aqueous solution) because the ions become free to move. However, they do not conduct electricity in the solid state because the movement of ions is restricted by the rigid crystal structure. Hence, statement 3 is a correct property.

• Solubility: Electrovalent or ionic compounds are generally soluble in water (which is a polar solvent) but are insoluble in organic solvents such as kerosene, petrol, benzene, and ether (which are non-polar solvents). This follows the principle of "like dissolves like." Hence, statement 4 is NOT a property of ionic compounds.

• Therefore, the correct answer is option 4.

Additional Information

• Formation of Ionic Bonds: An ionic bond is formed by the complete transfer of one or more valence electrons from a metal atom to a non-metal atom. This transfer results in the formation of ions that achieve a stable noble gas electronic configuration.

• Lattice Energy: The stability of an ionic compound is attributed to its lattice energy, which is the energy released when one mole

of an ionic crystalline compound is formed from gaseous ions. Magnesium Oxide (MgO) and Sodium Chloride (NaCl) are classic examples of such structures.

• Crystal Lattice: Ionic compounds do not exist as single molecules but as aggregates of ions arranged in a regular three-dimensional pattern called a crystal lattice. For instance, in NaCl, each Sodium ion is surrounded by six Chloride ions and vice-versa.

• Comparison with Covalent Compounds: Unlike ionic compounds, covalent compounds are formed by the sharing of electrons. They generally have lower melting and boiling points, can be gases, liquids, or solids at room temperature, and are typically non-conductors of electricity.

Important Points

• Dielectric Constant: Water has a high dielectric constant (approx. 80), which weakens the electrostatic forces between ions, facilitating their dissociation and making water an excellent solvent for ionic substances.

• Hydration Energy: When an ionic compound dissolves in water, the ions are surrounded by water molecules, a process called hydration. If the hydration energy is higher than the lattice energy, the compound will be soluble.

• Chemical Reactivity: Reactions involving ionic compounds in aqueous solutions are usually very fast because they occur between free ions rather than neutral atoms or molecules.

Q17. Answer: (a) virtual, erect, and diminished

The correct answer is virtual, erect, and diminished.

Key Points

• A convex mirror, also known as a diverging mirror, is a spherical mirror where the reflecting surface bulges outwards toward the light source.

• Regardless of the position of the object, a convex mirror always forms an image that is virtual, meaning it is formed behind the mirror and cannot be obtained on a screen.

• The image produced is consistently erect (upright), which is a primary reason for its specific applications in daily life.

• The size of the image is always diminished, meaning it is smaller than the actual size of the object being reflected.

• When an object is placed at infinity, the image is formed at the principal focus (F) behind the mirror and is highly diminished or point-sized.

• When the object is placed at a finite distance from the mirror, the image is formed between the pole (P) and the focus (F) behind the mirror.

Additional Information

• Uses in Vehicles: Convex mirrors are predominantly used as rearview mirrors in cars, motorcycles, and trucks. This is because they provide a wider field of view, allowing the driver to see a much larger area of traffic behind them compared to a plane mirror.

• Safety and Security: These mirrors are installed in blind corners of roads, parking lots, and automated teller machines (ATMs) to help people see what is around the corner or behind them, enhancing security.

• Shop Security: Large convex mirrors are often used in retail stores and warehouses as "security mirrors" to monitor aisles and prevent shoplifting.

• Sign Convention: In the Cartesian sign convention, the focal length (f) and the radius of curvature (R) of a convex mirror are always taken as positive because the focus lies behind the reflecting surface.

• Comparison with Concave Mirrors: Unlike convex mirrors, a concave mirror (converging mirror) can form both real and virtual images, as well as magnified or diminished images, depending on the distance of the object from the pole.

Important Points

• Magnification (m): The linear magnification produced by a convex mirror is always positive and less than 1. The formula for magnification is m = h2 / h1 = -v / u, where h2 is image height, h1 is object height, v is image distance, and u is object distance.

• Mirror Formula: The relationship between focal length (f), object distance (u), and image distance (v) is given by the mirror formula: 1/f = 1/v + 1/u.

• Diverging Nature: When parallel rays of light strike a convex mirror, they diverge after reflection. If these reflected rays are extended backwards, they appear to meet at a single point called the principal focus (F).

• Radius of Curvature: The distance from the pole to the center of curvature (C) is the radius (R), which is related to the focal length by the expression R = 2f.

Q18. Answer: (b) directly proportional to the current

The correct answer is directly proportional to the current.

Key Points

• Ohm’s law states that the potential difference (V) across the ends of a given metallic wire in an electric circuit is directly proportional to the current (I) flowing through it, provided its temperature remains the same.

• This relationship is mathematically expressed as V prop. to I. This means that if the potential difference increases, the current

increases proportionally, and vice versa. Hence, statement 2 is correct.

• The constant of proportionality is called Resistance (R), leading to the formula V = I × R. While resistance is a factor, the potential difference is the product of current and resistance, not just equal to the resistance. Hence, statement 1 is incorrect.

• Because of the direct proportionality defined by the law, the potential difference is strictly dependent on the amount of current flowing through the conductor. Hence, statement 3 is incorrect.

• If the potential difference were inversely proportional to the current, the formula would be V prop. to 1/I, which is not the case for ohmic conductors. In such a scenario, increasing the voltage would decrease the current, which contradicts the fundamental behavior of standard circuits. Hence, statement 4 is incorrect.

• The law is a fundamental principle used to calculate the voltage, current, or resistance in an electrical circuit when the other two quantities are known.

Additional Information

• Historical Context: The law was named after the German physicist Georg Simon Ohm, who published his findings in the year 1827. His work was pivotal in the development of electrical circuit theory.

• SI Units:

• The SI unit of Potential Difference is the Volt (V).

• The SI unit of Electric Current is the Ampere (A).

• The SI unit of Resistance is the Ohm (Ω).

• Factors Affecting Resistance: The resistance (R) of a uniform metallic conductor is directly proportional to its length (L), inversely proportional to its area of cross-section (A), and depends on the nature of the material and its temperature.

• Ohmic Conductors: These are materials that strictly obey Ohm's law. Examples include copper, silver, and aluminum. For these materials, a V-I graph (Voltage vs. Current) results in a straight line passing through the origin.

• Non-Ohmic Conductors: Materials and devices that do not follow the linear relationship of Ohm's law are called non-ohmic. Examples include semiconductors, diodes, transistors, and vacuum tubes.

Important Points

• Temperature Sensitivity: One of the primary conditions for Ohm's law to hold true is that the physical conditions, especially the temperature, must remain constant. If the temperature of a conductor increases, its resistance typically increases, leading to a non-linear relationship between V and I.

• Power Calculation: Using Ohm's law, we can derive the formula for Electrical Power (P). Since P = V × I and V = I × R, power can also be expressed as P = I^2 × R or P = V^2 / R.

• Practical Application: Ohm's law is used by engineers and technicians to design electronic components, calculate fuse ratings, and determine the correct wire gauge for household and industrial wiring to prevent overheating.

• Numerical Value Example: If a circuit has a resistance of 10 Ohms and a potential difference of 50 Volts is applied, the current flowing through it will be 5 Amperes (I = V/R = 50/10).

Q19. Answer: (d) 0.5 Ω

The correct answer is 0.5 Ω.

Key Points

• The resistance of a conductor is defined as the property by which it opposes the flow of electric current through it. It is mathematically expressed by the formula R = ρ (L / A), where R is the resistance, ρ (rho) is the electrical resistivity, L is the length, and A is the cross-sectional area.

• From the formula, it is evident that the resistance of a wire is directly proportional to its length (R prop. to L). This means that if the length of the wire is increased, the resistance increases, and if the length is decreased, the resistance decreases accordingly. Hence, the reduction in length directly impacts the resistance value.

• In this specific case, a wire with an initial resistance of 1 Ω is cut into two equal parts. This implies that the new length of each part becomes half of the original length (L' = L / 2).

• Since the wire is only cut and not stretched or compressed, the cross-sectional area (A) and the material (resistivity ρ) remain constant for each of the two parts.

• By substituting the new length into the resistance formula: R' = ρ ((L/2) / A) = 1/2 [ρ (L / A)] = R / 2. Given the original resistance R = 1 Ω, the new resistance R' for each part is 1 / 2 = 0.5 Ω. Hence, the correct answer is 0.5 Ω.

Additional Information

• Factors Affecting Resistance:

• Length (L): As discussed, resistance increases with length. This is because electrons encounter more collisions with atoms while traveling a longer path.

• Area of Cross-section (A): Resistance is inversely proportional to the area (R prop. to 1/A). A thicker wire offers less resistance compared to a thinner wire because there is more space for the electrons to flow.

• Material: Different materials have different resistivities (ρ). Conductors like Copper and Aluminum have low resistivity, while

insulators like Glass or Rubber have extremely high resistivity.

• Temperature: For metallic conductors, resistance typically increases with an increase in temperature due to increased thermal agitation of the atoms.

• Ohm's Law:

• Proposed by Georg Simon Ohm in 1827, it states that the current (I) flowing through a conductor is directly proportional to the potential difference (V) across its ends, provided physical conditions like temperature remain constant (V = IR).

Important Points

• Resistance vs. Resistivity: While resistance depends on the dimensions (length and area) of the object, resistivity is an intrinsic property of the material. Cutting a wire changes its resistance but does not change its resistivity.

• Stretching vs. Cutting: If a wire is stretched to double its length, its volume remains constant, causing the area to decrease. In such a case, the resistance increases by four times (n^2). However, in cutting, the area remains the same, so the resistance changes linearly with length.

• Combination of Resistors:

• If these two 0.5 Ω parts are connected in series, the total resistance is 0.5 + 0.5 = 1 Ω.

• If they are connected in parallel, the equivalent resistance is (0.5 × 0.5) / (0.5 + 0.5) = 0.25 Ω.

• Units: The SI unit of resistance is the Ohm (Ω), and the SI unit of resistivity is the Ohm-meter (Ω·m).

Q20. Answer: (c) 4 m

The correct answer is 4 m.

Key Points

• The gravitational potential energy (G.P.E.) of an object is the energy it possesses due to its position in a gravitational field. The formula to calculate it is Potential Energy (P.E.) = m × g × h.

• In this specific problem, the mass (m) of the object is 11 kg, the acceleration due to gravity (g) is 10 m/s^2, and the potential energy (P.E.) is 440 J.

• By substituting these values into the formula, we get the equation: 440 = 11 × 10 × h.

• Simplifying the right side of the equation results in 440 = 110 × h.

• To find the height (h), we divide the total energy by the product of mass and gravity: h = 440 / 110.

• The final calculation gives h = 4 m. Hence, the correct answer is 4 m.

Additional Information

• Potential Energy: This is a form of stored energy that depends on the relative position of various parts of a system. A spring has more potential energy when it is compressed or stretched. A steel ball has more potential energy raised above the ground than it has after falling to Earth.

• Mass (m): It is a fundamental property of matter and is a quantitative measure of inertia. The SI unit for mass is the kilogram (kg). Unlike weight, mass does not change based on the location of the object.

• Acceleration due to Gravity (g): This is the acceleration gained by an object due to gravitational force. Its value on the surface of the Earth is approximately 9.8 m/s^2, though it is often rounded to 10 m/s^2 in competitive exams for ease of calculation.

• Joule (J): It is the standard unit of energy in the International System of Units (SI). It is defined as the amount of work done when a force of one newton displaces an object through a distance of one meter in the direction of the force.

Important Points

• Relationship between Variables: In the formula P.E. = mgh, the potential energy is directly proportional to the mass, the height, and the gravitational acceleration. If the height is doubled while mass remains constant, the potential energy will also double.

• Conservation of Energy: According to the Law of Conservation of Energy, energy can neither be created nor destroyed; it can only be transformed from one form to another. When the object at 4 m height is released, its potential energy begins converting into kinetic energy as it falls.

• Work Done: The gravitational potential energy of an object at a point above the ground is defined as the work done in raising it from the ground to that point against gravity.

• Reference Level: The value of height (h) is always relative to a chosen zero level, which is typically the surface of the Earth or the ground level in most physics problems.

Q21. Answer: (c) DNA; ribosomes

The correct answer is DNA; ribosomes.

Key Points

• Plastids are double-membrane-bound organelles found in the cells of plants and algae. They play a vital role in manufacturing and storing food.

• Like mitochondria, plastids are semi-autonomous organelles, which means they possess their own genetic material in the form of DNA (Deoxyribonucleic Acid).

• In addition to DNA, plastids also contain their own ribosomes, specifically the 70S type, which is similar to those found in prokaryotic cells.

• The presence of independent DNA and ribosomes allows plastids to synthesize some of their own proteins and replicate through a process similar to binary fission, independent of the cell's nucleus.

• This shared characteristic between mitochondria and plastids is a fundamental piece of evidence for the Endosymbiotic Theory, suggesting they evolved from formerly free-living bacteria.

Additional Information

• Types of Plastids:

• Chloroplasts: These contain the green pigment chlorophyll and are the primary site for photosynthesis, converting solar energy into chemical energy.

• Chromoplasts: These contain fat-soluble carotenoid pigments like carotene and xanthophylls, which provide yellow, orange, or red colors to flowers and fruits.

• Leucoplasts: These are colorless plastids used for storing nutrients. They include Amyloplasts (store starch), Elaioplasts (store oils/fats), and Aleuroplasts (store proteins).

• Mitochondria: Often called the "Powerhouse of the cell," they are responsible for aerobic respiration and the production of ATP (Adenosine Triphosphate). Like plastids, they contain circular DNA and 70S ribosomes.

• Endosymbiotic Theory: Proposed by Lynn Margulis in the 1960s, it explains the origin of eukaryotic cells. The fact that these organelles have their own DNA and ribosomes suggests they were once independent prokaryotes that were engulfed by a host cell.

• Ribosome Differences: Eukaryotic cells generally have 80S ribosomes in their cytoplasm, but the 70S ribosomes found in plastids and mitochondria are a distinct prokaryotic feature, highlighting their unique evolutionary history.

Q22. Answer: (b) Mixing of vinegar and baking soda in a sealed container

The correct answer is Mixing of vinegar and baking soda in a sealed container.

Key Points

• The Law of Conservation of Mass states that mass in an isolated system is neither created nor destroyed by chemical reactions or physical transformations. This means the mass of the products must equal the mass of the reactants.

• Mixing of vinegar and baking soda in a sealed container is the best example because a sealed container prevents any gaseous products (like carbon dioxide) from escaping into the atmosphere. By weighing the container before and after the reaction, the total mass remains constant, directly proving the law. Hence, statement 2 is correct.

• Heating iron in open air involves the iron reacting with oxygen from the surrounding atmosphere to form iron oxide (rust). In an open system, the final product will weigh more than the initial iron because the mass of the absorbed oxygen is not factored into the starting weight by a casual observer. Hence, statement 1 is incorrect.

• Evaporation of alcohol in open air is a physical change where the liquid alcohol turns into vapor. Since it happens in open air, the alcohol molecules disperse into the environment, leading to a decrease in the measurable mass of the remaining liquid. Hence, statement 3 is incorrect.

• Burning of paper in open air results in the production of ash, carbon dioxide, and water vapor. In an open system, the gases escape, leaving only the ash behind, which weighs significantly less than the original paper, making it appear as though mass was lost. Hence, statement 4 is incorrect.

Additional Information

• Antoine Lavoisier: A French chemist often referred to as the Father of Modern Chemistry, he formulated the Law of Conservation of Mass in 1789. His meticulous quantitative experiments with combustion and oxidation laid the foundation for modern stoichiometry.

• Open vs. Closed Systems: An open system can exchange both energy and matter with its surroundings, while a closed system can exchange energy but not matter. To experimentally verify the Law of Conservation of Mass, a closed system (like a sealed flask or container) is essential, especially when gases are involved as reactants or products.

• The Vinegar and Baking Soda Reaction: This is an acid-base reaction. The acetic acid (vinegar) reacts with sodium bicarbonate (baking soda) to produce sodium acetate, water, and carbon dioxide gas. The chemical equation is: CH3COOH + NaHCO3 -> CH3COONa + H2O + CO2.

• Significance in Stoichiometry: This law is fundamental for balancing chemical equations. It ensures that the number of atoms of each element is the same on both the reactant and product sides of the equation, reflecting that atoms are merely rearranged, not created or lost.

Important Points

• Mass-Energy Equivalence: While the Law of Conservation of Mass holds true for chemical reactions, in nuclear reactions, mass can be converted into energy according to Albert Einstein's equation E = mc^2. In such cases, the combined conservation of mass-energy is observed.

• Practical Application: This law is used daily in industrial processes, cooking, and environmental science to calculate yields and

track pollutants. For example, in water treatment, the amount of chemicals added must be balanced against the impurities removed to ensure mass balance.

• Historical Context: Before Lavoisier, the Phlogiston theory was widely accepted, which suggested that mass was lost during combustion because a substance called "phlogiston" was released. Lavoisier's accurate weighing of mercury oxide reactions eventually disproved this theory.

Q23. Answer: (a) Evolution

The correct answer is Evolution.

Key Points

• Sexual reproduction is a biological process that involves the fusion of haploid gametes (sperm and egg) from two parents to form a diploid zygote. This process is the primary source of genetic variation in eukaryotic organisms.

• The main driver of this variation is meiosis, specifically the stages of prophase I and metaphase I. During crossing over, homologous chromosomes exchange segments of DNA, creating new combinations of alleles that did not exist in either parent.

• Evolution is the result of natural selection acting upon these genetic variations over many generations. Variations that provide a survival advantage are more likely to be passed on to offspring, leading to gradual changes in the gene pool of a population. Hence, statement 1 is correct.

• Without the variation introduced by sexual reproduction, populations would have limited adaptive capacity, making them highly vulnerable to environmental changes and significantly slowing down the process of speciation and evolution.

• While mutations also contribute to variation, sexual reproduction reshuffles existing genotypes into an almost infinite variety of new phenotypes, providing the raw material for evolutionary change.

Additional Information

• Formation of Identical Twins: Identical (monozygotic) twins occur when a single fertilized egg (zygote) splits into two separate embryos. Because they originate from the same DNA sequence, they are genetically identical. This is an exception to the rule of variation in sexual reproduction and does not represent the introduction of "new" variation. Hence, statement 2 is incorrect.

• Production of Genetically Identical Offspring: This is a hallmark of asexual reproduction (such as binary fission, budding, or fragmentation). In these processes, the offspring are clones of the parent. Sexual reproduction, by definition, aims to create genetically unique individuals. Hence, statement 3 is incorrect.

• Chances of Survival: Genetic variation generally leads to increased chances of survival for a species. A diverse population is more likely to contain individuals with traits that can withstand diseases, predators, or climate change. Lack of variation (genetic bottleneck) often leads to a higher risk of extinction. Hence, statement 4 is incorrect.

• Mechanisms of Variation:

• Independent Assortment: Occurs during meiosis when chromosomes align randomly, leading to over 8.4 million possible combinations in humans.

• Random Fertilization: Any sperm can fuse with any ovum, further squaring the potential genotypic combinations to trillions of possibilities for a single couple.

• Importance of Biodiversity: The cumulative effect of evolution driven by sexual variation is the vast biodiversity observed on Earth, allowing life to occupy diverse ecological niches.

Q24. Answer: (b) Amylase

The correct answer is Amylase.

Key Points

• Amylase, specifically salivary amylase (also known as ptyalin), is the primary enzyme found in human saliva responsible for the chemical digestion of carbohydrates.

• Its main function is to catalyze the hydrolysis of starch into simpler sugars like maltose and dextrin. This process marks the very beginning of the digestive process in the buccal cavity (mouth).

• The enzyme works optimally at a pH of approximately 6.8, which is slightly acidic to neutral, matching the environment of the mouth.

• About 30% of starch is hydrolyzed in the mouth by this enzyme before the food reaches the stomach. Hence, the option Amylase is correct.

• Salivary amylase is secreted by the salivary glands, which include the parotid, submandibular, and sublingual glands.

Additional Information

• Lipase:

• Lipases are enzymes responsible for breaking down fats (lipids) into fatty acids and glycerol.

• While a small amount of lingual lipase is present in saliva, the most significant fat digestion occurs in the small intestine via pancreatic lipase.

• Gastric lipase is also secreted in the stomach to aid in the digestion of tributyrin (butter fat).

• Pepsin:

• Pepsin is a powerful protease enzyme found in the gastric juice of the stomach.

• It is secreted in its inactive form, pepsinogen, which is activated by Hydrochloric acid (HCl).

• Its primary role is to break down proteins into smaller units called peptones and proteoses.

• Trypsin:

• Trypsin is another proteolytic enzyme (protease) but it is produced by the pancreas.

• It is secreted into the duodenum (the first part of the small intestine) in the form of trypsinogen.

• It functions in an alkaline medium (pH 7.8 to 8.5) to further break down proteins and peptides into amino acids.

Important Points

• Digestion Process: The human digestive system uses both mechanical (chewing) and chemical (enzymatic) methods to process food. Starch digestion is unique because it begins immediately upon contact with saliva.

• Enzyme Specificity: Enzymes are biological catalysts that are highly specific to their substrates. For example, Amylase acts only on carbohydrates, while Pepsin and Trypsin act only on proteins.

• Pancreatic Amylase: In addition to the mouth, the pancreas also secretes amylase into the small intestine to complete the breakdown of any remaining starch that was not processed in the mouth.

• Location Summary:

• Salivary Amylase: Mouth (Salivary Glands).

• Pepsin: Stomach (Gastric Glands).

• Trypsin/Lipase: Small Intestine (from Pancreas).

Q25. Answer: (a) food chains

The correct answer is food chains.

Key Points

• A food web is a complex, interconnected network of food chains that represents the feeding relationships within an ecological community.

• While a food chain follows a single, linear path of energy flow (e.g., grass → grasshopper → frog → snake), a food web shows how various food chains overlap and connect. Hence, the statement that a food web consists of different food chains is correct.

• In a food web, an organism can occupy multiple trophic levels simultaneously. For instance, an omnivore like a bear may eat berries (acting as a primary consumer) and fish (acting as a secondary or tertiary consumer).

• The food web provides a more realistic model of energy flow in an ecosystem because most organisms consume more than one type of prey and are, in turn, preyed upon by multiple predators.

• The structure of a food web ensures ecosystem stability; if one species is removed, the multiple pathways of the web allow the system to maintain its balance by shifting energy flow to other food chains.

Additional Information

• Trophic Levels:

• These are the functional positions of organisms within a food chain or web.

• The first trophic level consists of producers (autotrophs like plants and algae).

• The second level includes herbivores (primary consumers), followed by carnivores and omnivores at higher levels.

• The 10% Rule:

• Proposed by Raymond Lindeman in 1942, this ecological law states that only about 10% of the energy is transferred from one trophic level to the next.

• The remaining 90% is lost as heat during metabolic processes or used for growth and respiration.

• Decomposers and Detritivores:

• Organisms like fungi, bacteria, and earthworms play a vital role in the food web by breaking down dead organic matter.

• They recycle essential nutrients back into the soil, making them available again for producers.

• Ecological Pyramids:

• These are graphical representations designed to show the biomass, energy, or number of organisms at each trophic level.

• In most healthy ecosystems, the pyramid of energy is always upright, meaning energy decreases as you move up the levels.

Important Points

• Bioaccumulation and Biomagnification: In a food web, certain pollutants (like mercury or DDT) do not break down and instead increase in concentration as they move up to higher trophic levels, often harming apex predators.

• Keystone Species: Some species have a disproportionately large effect on their food web. If a keystone species (like a wolf or sea otter) is removed, the entire ecosystem structure can collapse or change drastically.

• Types of Food Chains: There are two main types: the grazing food chain (starts with green plants) and the detritus food chain

(starts with dead organic matter). Both intermingle to form the food web.

Q26. Answer: (b) 455

Shortcut Trick

Identify the numbers as multiples of 13: 13×1, 13×5, and 13×7.

The LCM must contain the common factor 13 and all unique prime factors 5 and 7.

LCM = 13 × 5 × 7 = 65 × 7 = 455.

Therefore The correct answer is 455.

Alternate Method

Given: Numbers are 13, 65, and 91.

Formula Used: Prime Factorization Method.

=> Prime factorization of 13 = 13^1

=> Prime factorization of 65 = $5^1 \times 13^1$

=> Prime factorization of 91 = $7^1 \times 13^1$

=> LCM = Product of highest powers of all prime factors = $13^1 \times 5^1 \times 7^1$

=> LCM = 13 × 35 = 455

Therefore The correct answer is 455.

Additional Information

LCM and HCF Relationship

For two numbers a and b, the product of the numbers is equal to the product of their LCM and HCF: a × b = LCM(a, b) × HCF(a, b).

HCF of 13, 65, 91

The Highest Common Factor is the largest number that divides all given numbers. Here, HCF = 13.

Co-prime Numbers

If the HCF of two numbers is 1, they are called co-prime, and their LCM is simply their product.

Q27. Answer: (c) 16

Shortcut Trick

Convert quickly using decimal form

60% of 45 = 0.6 × 45 = 27

1/5 of 55 = 11

Difference = 27 − 11

Therefore Answer = 16

Alternate Method

Given:

60% of 45 and 1/5 of 55

Formula used:

x% of y = (x/100) × y

Calculation:

=> 60% of 45 = (60/100) × 45 = 27

=> 1/5 of 55 = 55 ÷ 5 = 11

=> Difference = 27 − 11 = 16

Therefore The correct answer is 16.

Additional Information

Percentage Formula

x% of y = (x/100) × y

Fraction to Percentage

1/5 = 20%, so 1/5 of any number = 20% of it

Quick Multiplication Trick

0.6 × 45 = (6 × 45)/10 = 27

Difference Concept

If A is greater than B, then Difference = A − B

YourMockTest.com — Free Study Material

Q28. Answer: (b) 24.8%

Shortcut Trick

Let the total valid votes be 100%.

Votes for Candidate A = 40%.

Votes for Candidate B = 40% − 12% = 28%.

Votes for Candidate C = 100% − (40% + 28%) = 32%.

Wait, if Candidate B received 12% fewer votes than A (as a direct percentage of valid votes):

Votes for C = 100% − 40% − 35.2% = 24.8% (since 12% of 40 is 4.8%).

Therefore The correct answer is 24.8%.

Alternate Method

Given: Total voters = 75,000. Valid votes = 95% of 75,000.

Formula: Total Valid Votes = 100% | Candidate C% = 100% − (%A + %B).

=> Let total valid votes cast = 100%.

=> Percentage of votes for Candidate A = 40%.

=> Candidate B received 12% fewer votes than A => 40% − (12% of 40%).

=> Candidate B = 40% − 4.8% = 35.2%.

=> Percentage of votes for Candidate C = 100% − (40% + 35.2%).

=> Candidate C = 100% − 75.2% = 24.8%.

Therefore The correct answer is 24.8%.

Additional Information

Percentage Comparison

When a value is x% less than y, the value is calculated as y × (100 − x)/100. In this case, B = 40 × (88/100).

Valid vs Invalid Votes

Total Votes Cast = Valid Votes + Invalid Votes. Winners and losers are always calculated based on Valid Votes unless specified otherwise.

Voter Turnout

Voter turnout is the percentage of eligible voters who cast a ballot in an election. Here, 95% of 75,000 represents the actual turnout.

Q29. Answer: (a) 119

Shortcut Trick

In a proportion a : b :: c : d, the product of extremes equals the product of means.

P × 6 = 17 × 42

P = 17 × (42 ÷ 6) = 17 × 7 = 119

Therefore The correct answer is 119.

Alternate Method

Given: P : 17 :: 42 : 6

Formula Used: If a : b :: c : d, then a/b = c/d

=> P/17 = 42/6

=> P/17 = 7

=> P = 7 × 17

=> P = 119

Therefore The correct answer is 119.

Additional Information

Fourth Proportional

If four quantities a, b, c, and d are in proportion, then d is called the fourth proportional to a, b, and c, where d = (b × c) ÷ a.

Mean Proportional

The mean proportional between two numbers a and b is given by √(a × b).

Continued Proportion

Three numbers a, b, and c are said to be in continued proportion if a : b :: b : c, which implies $b^2 = a \times c$.

YourMockTest.com — Free Study Material

Q30. Answer: (d) 4096

Shortcut Trick

When a large sphere is melted to form small spheres, the number of laddoos is the cube of the ratio of their radii.

Ratio of radii (k) = 32 cm ÷ 2 cm = 16

Number of small laddoos = $k^3 = 16^3$

Number = 16 × 16 × 16 = 4096

Therefore The correct answer is 4096 laddoos.

Alternate Method

Given:

Radius of the large laddoo (R) = 32 cm

Radius of the small laddoo (r) = 2 cm

Formula Used:

Volume of a sphere = $(4/3) \times \pi \times r^3$

Number of laddoos = Volume of large laddoo ÷ Volume of small laddoo

Calculations:

=> Number = $[(4/3) \times \pi \times (32)^3] \div [(4/3) \times \pi \times (2)^3]$

=> Number = $(32 \times 32 \times 32) \div (2 \times 2 \times 2)$

=> Number = $(32 \div 2) \times (32 \div 2) \times (32 \div 2)$

=> Number = 16 × 16 × 16

=> Number = 256 × 16

=> Number = 4096

Therefore The correct answer is 4096 laddoos.

Additional Information

Volume of a Sphere

The total space occupied by a 3D sphere is given by $V = (4/3)\pi r^3$.

Surface Area of a Sphere

The total external area of a sphere is given by $A = 4\pi r^2$.

Volume of a Hemisphere

Half of a sphere has a volume given by $V = (2/3)\pi r^3$.

Conservation of Volume

When one solid object is recast into multiple smaller objects of the same material, the total volume remains constant.

Q31. Answer: (c) 400

Shortcut Trick

Savings = 10%, therefore Expenditure = 90%.

90% of Income = Rs. 360

100% of Income = (360 ÷ 90) × 100 = 4 × 100 = Rs. 400.

Therefore The correct answer is Rs. 400.

Alternate Method

Given:

Savings percentage = 10%

Expenditure = Rs. 360

Formula Used:

Income = Expenditure + Savings

=> Let total Income be x.

=> Savings = 10% of x = 0.1x

=> Expenditure = Income − Savings

=> 360 = x − 0.1x

=> 360 = 0.9x

=> x = 360 ÷ 0.9

=> x = 3600 ÷ 9 = 400

Therefore The correct answer is Rs. 400.

Additional Information

Percentage Change in Income

If income increases by a% and expenditure increases by b%, the new values can be calculated using the base multiplier (1 + r/100).

Savings Ratio

The ratio of Income : Expenditure : Savings is vital for solving complex arithmetic problems involving multiple people.

Base Value Concept

In income-based problems, the Total Income is always considered as the 100% base value for calculations.

Q32. Answer: (b) 100

Shortcut Trick

Identify that 0.011 = 1.1 × 10^(−2) and 0.009 = 0.9 × 10^(−2).

Denominator = $(10^{(-2)})^2 \times (1.1^2 - 0.9^2) = 10^{(-4)} \times$ Numerator.

The expression becomes $(1 / 10^{(-4)}) \times 0.1^2 = 10^4 \times 0.01$.

Calculation: 10000 × 0.01 = 100.

Therefore The correct answer is 100.

Alternate Method

Given: $[(1.1^2 - 0.9^2) / (0.011^2 - 0.009^2)] \times 0.1^2$

Formula Used: $a^2 - b^2 = (a + b)(a - b)$

=> Numerator = (1.1 + 0.9) × (1.1 − 0.9) = 2.0 × 0.2 = 0.4

=> Denominator = (0.011 + 0.009) × (0.011 − 0.009) = 0.020 × 0.002 = 0.00004

=> Expression = (0.4 / 0.00004) × (0.1 × 0.1)

=> Expression = (40000 / 4) × 0.01

=> Expression = 10000 × 0.01 = 100

Therefore The correct answer is 100.

Additional Information

Difference of Squares Identity

The algebraic identity $a^2 - b^2 = (a + b)(a - b)$ is essential for simplifying expressions involving squares of decimals or large numbers.

Powers of Ten in Decimals

When a number is shifted by n decimal places, its square is shifted by 2n decimal places. For example, $(0.1)^2 = 0.01$ and $(0.01)^2 = 0.0001$.

Decimal Division Rule

To divide decimals, multiply both the numerator and denominator by a power of 10 that makes the denominator an integer, maintaining the ratio.

Q33. Answer: (d) 12 m/s

Shortcut Trick

Total distance to cross each other = Sum of lengths = 444 + 444 = 888 m

Relative speed (opposite direction) = Distance ÷ Time = 888 ÷ 37 = 24 m/s

Since speeds are equal, individual speed = Relative speed ÷ 2 = 24 ÷ 2 = 12 m/s

Therefore The correct answer is 12 m/s.

Alternate Method

Given:

Length of Train 1 (L1) = 444 m

Length of Train 2 (L2) = 444 m

Time taken to cross (t) = 37 seconds

Speed of each train = v (as they are equal)

Formula Used:

Relative Speed = Total Distance ÷ Total Time

Calculations:

=> Total Distance = L1 + L2 = 444 + 444 = 888 m

=> Relative Speed = v + v = 2v (since they move in opposite directions)

=> 2v = 888 ÷ 37

=> 2v = 24

=> v = 24 ÷ 2

=> v = 12 m/s

Therefore The correct answer is 12 m/s.

Additional Information

Relative Speed in Opposite Direction

When two objects move toward each other, their relative speed is the sum of their individual speeds: S_(rel) = S1 + S2.

Relative Speed in Same Direction

When two objects move in the same direction, their relative speed is the difference of their individual speeds: S_(rel) = |S1 − S2|.

Conversion of Speed Units

To convert km/hr to m/s, multiply by 5/18. To convert m/s to km/hr, multiply by 18/5.

Q34. Answer: (b) 58.38%

Shortcut Trick

Effective Price percentage = 100 × (1 − d1/100) × (1 − d2/100) × (1 − d3/100)

=> Effective Price = 100 × (1 − 11/100) × (1 − 18/100) × (1 − 20/100)

=> Effective Price = 100 × 0.89 × 0.82 × 0.80

=> Effective Price = 89 × 0.656 = 58.384%

Rounding to two decimal places, we get 58.38%.

Therefore The correct answer is 58.38%.

Alternate Method

Given → Marked Price (MP) = 100, Discount 1 = 11%, Discount 2 = 18%, Discount 3 = 20%.

Formulas: Price after Discount = MP × (100 − D1%)/100 × (100 − D2%)/100 ...

=> Let Marked Price be 100 units.

=> Price after 11% discount = 100 − 11 = 89.

=> Price after 18% discount on 89 = 89 − (18% of 89) = 89 − 16.02 = 72.98.

=> Price after 20% discount on 72.98 = 72.98 − (20% of 72.98) = 72.98 − 14.596 = 58.384.

=> Effective Price percentage = (58.384 / 100) × 100 = 58.384%.

Therefore The correct answer is 58.38%.

Additional Information

Successive Discounts

When multiple discounts are applied one after another, the single equivalent discount is calculated using the formula: a + b − (ab/100). For three discounts, apply the formula twice.

Effective Price vs Discount

The effective price percentage is (100 − Net Discount%). It represents the final amount the customer pays relative to the original marked price.

Q35. Answer: (a) 22

Shortcut Trick

The Mode of a data set is simply the observation with the highest frequency.

Scan the list and count occurrences: 22 appears 4 times, 23 appears 2 times, and 29 appears 2 times.

All other numbers (20, 21, 26, 27, 28, 31, 32, 33, 34) appear only once.

Since 22 has the maximum frequency (4), it is the mode.

Therefore The correct answer is 22.

Alternate Method

Given Data: 22, 21, 22, 20, 33, 34, 22, 29, 29, 31, 23, 23, 28, 32, 22, 26, 27

Frequency calculation for each unique observation:

=> Count of 22: 4 times

=> Count of 23: 2 times

=> Count of 29: 2 times

=> Count of {20, 21, 26, 27, 28, 31, 32, 33, 34}: 1 time each

=> Mode = Value with Maximum Frequency

YourMockTest.com — Free Study Material

=> Maximum Frequency = 4 (for value 22)

Therefore The correct answer is 22.

Additional Information

Mean (Arithmetic Average)

The sum of all observations divided by the total number of observations: Mean = (Σx_i) ÷ n.

Median

The middle value of a data set when arranged in ascending or descending order. For odd n, Median = [(n+1)/2]^(th) term.

Empirical Relationship

For a moderately skewed distribution, the relationship is: Mode = 3 × Median − 2 × Mean.

Range

The difference between the maximum value and the minimum value in a data set: Range = Max − Min.

Q36. Answer: (d) 6

Shortcut Trick

The average of the first n odd natural numbers is always equal to n.

Here, n = 6 (as we need the average of the first 6 odd numbers).

Therefore Average = 6.

Therefore The correct answer is 6.

Alternate Method

Given: The first 6 odd natural numbers are 1, 3, 5, 7, 9, and 11.

Formula: Average = (Sum of observations) ÷ (Total number of observations)

=> Sum = 1 + 3 + 5 + 7 + 9 + 11

=> Sum = 36

=> Total Count = 6

=> Average = 36 ÷ 6

=> Average = 6

Therefore The correct answer is 6.

Additional Information

Sum of first n odd numbers

The Sum of the first n consecutive odd natural numbers is always n^2.

Average of first n even numbers

The Average of the first n consecutive even natural numbers is (n + 1).

Average of first n natural numbers

The Average of the first n consecutive natural numbers is (n + 1) ÷ 2.

Q37. Answer: (b) 128/5

Shortcut Trick

Convert to bases: 25=5², 125=5³, 4=2², 10=2×5, 6=2×3

First bracket => (5²×2^(−8)) ÷ (5^(−2)×2^(−15)) = 5^4×2^7

Second bracket => simplifies to 5^5

Whole => (5^4×2^7) ÷ 5^5 = 2^7×5^(−1)

Therefore Answer = 128 ÷ 5

Alternate Method

Given:

{ (25 × 4^(−4)) ÷ (5^(−3) × 10 × 4^(−8)) } ÷ { (3^(−5) × 10^(−5) × 125) ÷ (5^(−7) × 6^(−5)) }

Concept Used:

Laws of indices

Calculation:

=> 25 = 5², 125 = 5³, 4 = 2², 10 = 2 × 5, 6 = 2 × 3

=> First bracket = (5² × 2^(−8)) ÷ (5^(−3) × 2 × 5 × 2^(−16))

=> = (5² × 2^(−8)) ÷ (5^(−2) × 2^(−15))

=> = 5^(2−(−2)) × 2^(−8−(−15)) = 5^4 × 2^7

=> Second bracket = (3^(−5) × (2 × 5)^(−5) × 5³) ÷ (5^(−7) × (2 × 3)^(−5))
=> = (3^(−5) × 2^(−5) × 5^(−5) × 5³) ÷ (5^(−7) × 2^(−5) × 3^(−5))
=> = (5^(−2)) ÷ (5^(−7)) = 5^5
=> Whole expression = (5^4 × 2^7) ÷ 5^5
=> = 2^7 × 5^(−1) = 128 ÷ 5
Therefore The correct answer is 128/5
Additional Information
Laws of Indices
a^m ÷ aⁿ = a^(m−n), (a^m)ⁿ = a^(mn)
Negative Powers
a^(−n) = 1 / aⁿ
Prime Factorization
Convert numbers into primes for easy cancellation
Simplification Tip
Cancel same bases early to reduce calculation

Q38. Answer: (a) 16.67%

Shortcut Trick
CP of 1 orange = 300 ÷ 10 = Rs. 30.
SP of 1 orange = 175 ÷ 5 = Rs. 35.
Profit = 35 − 30 = Rs. 5.
Profit % = (5 ÷ 30) × 100 = 100 ÷ 6 = 16.666...%.
Rounding to two decimal places, we get 16.67%.
Therefore The correct answer is 16.67%.
Alternate Method
Given: CP of 10 oranges = Rs. 300, SP of 5 oranges = Rs. 175.
Formulas: Profit = SP − CP | Profit % = (Profit ÷ CP) × 100
=> To compare easily, make the quantity equal.
=> CP of 10 oranges = Rs. 300.
=> SP of 10 oranges = 2 × (SP of 5 oranges) = 2 × 175 = Rs. 350.
=> Profit = 350 − 300 = Rs. 50.
=> Profit % = (50 ÷ 300) × 100 = 16.67%.
Therefore The correct answer is 16.67%.
Additional Information
Unitary Method in P&L
Calculating the price of a single unit (Unitary Method) makes it easier to compare buying and selling rates when quantities differ.
Profit and Loss Percentage
Always calculate profit or loss percentage on the Cost Price (CP) unless stated otherwise in the problem.

Q39. Answer: (d) 59°

Shortcut Trick
In ΔBDC, angle BDC = 90° and angle DBC = 66° → angle C = 180° − (90° + 66°) = 24°.
In ΔAEC, angle AEB is the exterior angle at vertex E.
Exterior angle angle AEB = Sum of interior opposite angles = angle CAE + angle C.
angle AEB = 35° + 24° = 59°.
Therefore The correct answer is 59°.
Alternate Method
Given: BD perpendicular to AC, angle DBC = 66°, angle CAE = 35°.
Formula Used: Sum of angles in a triangle = 180°; Exterior Angle Theorem.
Step-by-step calculation:
=> In ΔBDC, the sum of angles is 180°.
=> angle BDC + angle DBC + angle BCD = 180°

=> 90° + 66° + angle C = 180°
=> angle C = 180° − 156° = 24°
=> Now, consider ΔAEC.
=> angle AEB is an exterior angle to ΔAEC at point E.
=> By Exterior Angle Property: angle AEB = angle CAE + angle ACE
=> angle AEB = 35° + 24° = 59°
Therefore The correct answer is 59°.
Additional Information
Exterior Angle Theorem
The measure of an exterior angle of a triangle is equal to the sum of the measures of its two remote interior angles.
Angle Sum Property
The sum of all interior angles in any triangle is always 180°.
Right Angled Triangle
In a right-angled triangle, the two acute angles are complementary (their sum is 90°).

Q40. Answer: (d) 18 days

Shortcut Trick
Assume Total Work = LCM(8, 24, 36) = 72 units.
Efficiency of X + Y + Z = 72 ÷ 8 = 9 units/day.
Efficiency of X = 72 ÷ 24 = 3 units/day.
Efficiency of Y = 72 ÷ 36 = 2 units/day.
Efficiency of Z = (X + Y + Z) − (X + Y) = 9 − (3 + 2) = 4 units/day.
Time taken by Z = 72 ÷ 4 = 18 days.
Therefore The correct answer is 18 days.
Alternate Method
Given: Time taken by (X+Y+Z) = 8 days, X = 24 days, Y = 36 days.
Formula Used: Total Work = Efficiency × Time | 1/Z = 1/(X+Y+Z) − 1/X − 1/Y

Person	Days	Total Work	Efficiency
X + Y + Z	8	72	9
X	24	3	
Y	36	2	

=> Efficiency of X + Y + Z = 9
=> Efficiency of X = 3
=> Efficiency of Y = 2
=> Efficiency of Z = 9 − 3 − 2 = 4 units/day
=> Time for Z alone = Total Work ÷ Efficiency of Z
=> Time = 72 ÷ 4 = 18 days
Therefore The correct answer is 18 days.
Additional Information
Efficiency and Time Relationship
Efficiency is inversely proportional to the time taken to complete the work (E prop. to 1/T).
Fraction Method
Work done by Z in 1 day = (1/Total days) − (1/X's days) − (1/Y's days).
Combined Work Formula
If A and B work together, total time = (A × B) ÷ (A + B).

Q41. Answer: (b) 3

Shortcut Trick
For a Sphere, the ratio of Volume (V) to Surface Area (S) is given by r/3.
Since the Volume and Surface Area are numerically equal, we have V/S = 1.
=> r/3 = 1

=> r = 3 units.
Therefore The correct answer is 3 units.
Alternate Method
Given:
The Volume of a sphere is numerically equal to its surface area.
Formula Used:
1. Volume of Sphere = (4/3) × π × r^3
2. Surface Area of Sphere = 4 × π × r^2
Calculations:
=> Volume = Surface Area
=> (4/3) × π × r^3 = 4 × π × r^2
=> (r^3) / (r^2) = (4 × π × 3) / (4 × π)
=> r = 3 units.
Therefore The correct answer is 3 units.
Additional Information
Volume and Area of Hemisphere
The volume of a hemisphere is (2/3)πr^3 and its Total Surface Area (TSA) is 3πr^2.
Great Circle
A great circle of a sphere is a circle that has the same radius and center as the sphere itself.
Archimedes' Principle for Sphere
The volume of a sphere is 2/3 of the volume of its circumscribed cylinder.

Q42. Answer: (a) 450

Shortcut Trick
Identify the Unitary Multiplier: 36 words ÷ 4 lines = 9 words per line.
Apply the multiplier to the new total: 50 lines × 9 words/line = 450 words.
Therefore The correct answer is 450 words.
Alternate Method
Given:
Number of lines (L1) = 4
Number of words (W1) = 36
Target lines (L2) = 50
Formula Used:
Direct Proportion: (W1 / L1) = (W2 / L2)
Calculations:
=> 36 / 4 = W2 / 50
=> 9 = W2 / 50
=> W2 = 9 × 50
=> W2 = 450
Therefore The correct answer is 450 words.
Additional Information
Direct Proportion
When two quantities increase or decrease at the same rate, they are in direct proportion (y = kx).
Unitary Method
Finding the value of a single unit first to calculate the value of multiple units.
Ratio Equality
The ratio of lines to words remains constant (1 line : 9 words).

Q43. Answer: (a) 10% loss

Shortcut Trick
Net percentage change = a + b + (a × b) ÷ 100
Here, a = +25% (Markup) and b = −28% (Discount).

Net change = 25 − 28 + (25 × −28) ÷ 100 = −3 + (−700) ÷ 100
Net change = −3 − 7 = −10%.
Negative sign indicates a 10% loss.
Therefore The correct answer is 10% loss.
Alternate Method
Given: Markup = 25%, Discount = 28%.
Formulas: MP = CP × (100 + Markup%) ÷ 100 | SP = MP × (100 − Discount%) ÷ 100 | Loss% = (CP − SP) ÷ CP × 100
=> Let Cost Price (CP) be 100.
=> Marked Price (MP) = 100 + 25% of 100 = 125.
=> Selling Price (SP) = 125 − 28% of 125 = 125 − (28 ÷ 100 × 125) = 125 − 35 = 90.
=> Loss = CP − SP = 100 − 90 = 10.
=> Loss Percentage = (10 ÷ 100) × 100 = 10%.
Therefore The correct answer is 10% loss.
Additional Information
Markup and Discount Relation
Profit or Loss percentage is the result of successive percentage changes on the Cost Price: (1 + Markup%) × (1 − Discount%) − 1.
Marked Price
The price listed on the label of an item, also known as the List Price or MRP.

Q44. Answer: (a) 7.5

Shortcut Trick
Original Distance = 225 km, Original Time = 15 hours → Original Speed = 15 kmph.
New Distance (40% less) = 225 × 0.6 = 135 km.
New Speed (20% faster) = 15 × 1.2 = 18 kmph.
New Time = 135 ÷ 18 = 7.5 hours.
Therefore The correct answer is 7.5 hours.
Alternate Method
Given:
Original Distance (D1) = 225 km
Original Time (T1) = 15 hours
Formula Used:
Speed = Distance ÷ Time
Time = Distance ÷ Speed
Calculations:
=> Original Speed (S1) = 225 ÷ 15 = 15 kmph
=> New Distance (D2) = 225 − (40% of 225)
=> D2 = 225 − (0.40 × 225) = 225 − 90 = 135 km
=> New Speed (S2) = 15 + (20% of 15)
=> S2 = 15 + (0.20 × 15) = 15 + 3 = 18 kmph
=> New Time (T2) = D2 ÷ S2 = 135 ÷ 18
=> T2 = 7.5 hours
Therefore The correct answer is 7.5 hours.
Additional Information
Speed-Distance Relationship
When time is constant, distance is directly proportional to speed (D1/D2 = S1/S2).
Average Speed
If a person covers two equal distances at speeds x and y, the Average Speed = 2xy ÷ (x + y).
Unit Conversion
To convert kmph to m/s, multiply by 5/18. To convert m/s to kmph, multiply by 18/5.

Q45. Answer: (d) 40

Shortcut Trick

Total Days = 7 (Feb) + 31 (Mar) + 23 (Apr) = 61 days.

As 2024 is a leap year, total days = 366.

Simple Interest (SI) = (4000 × 6 × 61) ÷ (100 × 366)

SI = 240 × (61 ÷ 366) = 240 × (1 ÷ 6) = Rs. 40.

Therefore The correct answer is Rs. 40.

Alternate Method

Given:

Principal (P) = Rs. 4,000

Rate (R) = 6% per annum

Formula Used: Simple Interest (SI) = (P × R × T) ÷ 100

=> Number of days calculation:

=> 2024 is a leap year (divisible by 4), so February has 29 days.

=> Days in February = 29 − 22 = 7 days

=> Days in March = 31 days

=> Days in April = 23 days

=> Total Time (T) = (7 + 31 + 23) = 61 days

=> In years, T = 61 ÷ 366 (since 2024 is a leap year)

=> SI = (4000 × 6 × 61) ÷ (100 × 366)

=> SI = (40 × 6 × 61) ÷ 366

=> SI = 240 × (61 ÷ 366) = 240 × (1 ÷ 6)

=> SI = Rs. 40

Therefore The correct answer is Rs. 40.

Additional Information

Leap Year Rule

A year is a leap year if it is divisible by 4. For century years, they must be divisible by 400. Leap years have 366 days instead of 365.

Simple Interest (SI) Formula

SI = (P × R × T) ÷ 100. Always ensure the Time (T) is in years; if given in days, divide by 365 (normal year) or 366 (leap year).

Day Counting Rule

While calculating the period, the day on which money is deposited is generally excluded, and the day on which money is withdrawn is included.

Q46. Answer: (d) 490

Shortcut Trick

Convert 6 hours into minutes: 6 × 60 = 360 minutes.

Total lines printed = 1,76,400.

Lines per minute = 1,76,400 ÷ 360 = 17,640 ÷ 36 = 490.

Therefore The correct answer is 490 lines.

Alternate Method

Given:

Total lines printed = 1,76,400

Total time of operation = 6 hours

Formula Used:

Rate of printing = Total lines ÷ Total time (in minutes)

Calculations:

=> Total time in minutes = 6 × 60 minutes

=> Total time in minutes = 360 minutes

=> Lines per minute = 1,76,400 ÷ 360

=> Lines per minute = 17,640 ÷ 36

=> Lines per minute = 490

Therefore The correct answer is 490 lines.

Additional Information

Unit Conversion

Always ensure the units of time are consistent with the required answer format (1 hour = 60 minutes = 3600 seconds).

Rate and Efficiency

Rate = Total Output ÷ Total Time. This concept is similar to speed (Distance ÷ Time) or efficiency in Time & Work problems.

Q47. Answer: (b) 4

Shortcut Trick

Let the total work be the LCM of 3, 9, and 18, which is 18 units.

Efficiencies of A, B, and C are 6, 2, and 1 units/day, respectively.

Combined efficiency of A + B + C = 6 + 2 + 1 = 9 units/day.

To complete twice the work (18 × 2 = 36 units), the time taken = 36 ÷ 9 = 4 days.

Therefore The correct answer is 4 days.

Alternate Method

Given:

Time taken by A = 3 days

Time taken by B = 9 days

Time taken by C = 18 days

Formula Used:

Efficiency = Total Work ÷ Time Taken

Time Taken = Total Work ÷ Total Efficiency

Person	Days	Total Work	Efficiency
A	3	18	6
B	9	2	
C	18	1	

Calculations:

=> Total combined efficiency of A, B and C = 6 + 2 + 1 = 9 units/day

=> Twice the original work = 2 × 18 = 36 units

=> Time taken to complete twice the work = 36 ÷ 9 = 4 days

Therefore The correct answer is 4 days.

Additional Information

Total Work LCM Method

Taking the LCM of individual days as the total work simplifies calculation by converting fractional work rates into whole number efficiencies.

Work and Efficiency Relation

Efficiency is inversely proportional to the time taken to complete a task. If a person takes more days, their daily work efficiency is lower.

Q48. Answer: (a) 37 years

Shortcut Trick

Let the younger sister be x and elder sister be x + 3.

Equation: (x + 3) + 2 = 2 × (x − 2)

x + 5 = 2x − 4 => x = 9.

Present ages: 9 and 12 years (Sum = 21).

Sum after 8 years = 21 + (2 × 8) = 37 years.

Therefore The correct answer is 37 years.

Alternate Method

Given: Difference in ages = 3 years. Relation after 2 years provided.

=> Let the present age of the younger sister = y

=> Present age of the elder sister = y + 3

=> According to the question: (y + 3) + 2 = 2 × (y − 2)

=> y + 5 = 2y − 4

=> 2y − y = 5 + 4

=> y = 9 years

=> Elder sister age = 9 + 3 = 12 years

=> Sum of their ages after 8 years = (9 + 8) + (12 + 8)

=> 17 + 20 = 37 years

Therefore The correct answer is 37 years.

Additional Information

Age Difference Property

The difference between the ages of two people remains constant regardless of the number of years passed or preceding.

Sum of Ages in Future

To find the sum of ages of 'n' people after 't' years, add (n × t) to the present sum of their ages.

Ratio Method for Ages

When age ratios at different time intervals are given, equate the unit difference of the parts to the actual year difference.

Q49. Answer: (a) 139.5 m

Shortcut Trick

Since the time is the same, the ratio of height to shadow remains constant.

Ratio = 15 ÷ 5 = 3.

Height of tower = 3 × Shadow length = 3 × 46.5.

Height of tower = 139.5 m.

Therefore The correct answer is 139.5 m.

Alternate Method

Given:

Height of stick (h) = 15 m

Shadow of stick (s) = 5 m

Shadow of tower (S) = 46.5 m

Formula Used:

For similar triangles formed by sun rays: Height1/Shadow1 = Height2/Shadow2

Calculations:

=> 15 / 5 = Height of tower / 46.5

=> 3 = Height of tower / 46.5

=> Height of tower = 3 × 46.5

=> Height of tower = 139.5 m

Therefore The correct answer is 139.5 m.

Additional Information

Similar Triangles in Shadows

Objects and their shadows form similar right-angled triangles because the angle of elevation of the sun is the same for both at any given moment.

Height and Distance Basics

Tan θ = Opposite / Adjacent. Here, Tan θ = Height / Shadow. Since θ (sun angle) is constant, the ratio H/S is always constant.

Q50. Answer: (b) 104

Shortcut Trick

Ratio of First : Second : Third numbers = 12 : 21 : 5.

Given: 50% of 1st number (12 units) = 78 → 6 units = 78 → 1 unit = 13.

Absolute difference between 2nd (21 units) and 3rd (5 units) = 16 units.

Required: 50% of 16 units = 8 units = 8 × 13 = 104.

Therefore The correct answer is 104.

Alternate Method

Given: Ratio = 12 : 21 : 5. Let numbers be 12x, 21x, and 5x.

=> 50% of 12x = 78

=> 6x = 78

=> x = 13

=> Absolute difference of 3rd and 2nd = |5x − 21x| = 16x

=> 50% of 16x = 8x

=> 8 × 13 = 104

Therefore The correct answer is 104.

Additional Information

Ratio and Proportion

If a : b : c is the ratio, the values can be taken as ax, bx, and cx where x is the common multiplier.

Percentage Calculation

50% of a number is simply half of that number (Value × 1/2).

Absolute Difference

The absolute difference |a − b| is always a non-negative value regardless of which number is larger.

Q51. Answer: (a) Only conclusion (II) follows

Given Statements:

All bags are shoes.

All bags are caps.

All bags are laptops.

The least possible Venn diagram for the given statements is:

Conclusions:

I. All shoes are laptops – Does not follow (Only bags are common to both shoes and laptops. It is not given that all shoes are laptops.)

II. Some laptops are caps – Follows (All bags are laptops and all bags are caps. Therefore, some laptops are definitely caps.)

So, only conclusion II follows.

Hence, the correct answer is "Option 1".

Q52. Answer: (a) 25

Given:

Total number of people = 46

G is 9th from the left end

Z is 12th from the right end

Now, Sum = 9 + 12 = 21

Number of people between = Total − (Left position + Right position)

= 46 − 21

= 25

Therefore, 25 people sit between G and Z.

Hence, the correct answer is Option 1.

Q53. Answer: (a) IOFK

The logic followed here is:

For, YEVA → JPGL

Now, for QWNS → BHYD

Now, applying the same logic for XDUZ:

So, XDUZ → IOFK

Hence, the correct answer is "Option 1".

Q54. Answer: (c) TWU−QTR

The logic followed here is based on the alphabetical position shift pattern between corresponding letters:

For, PSQ → MPN

For, GJH → DGE

Now check options:

Option 1: TVS → PSQ
Option 2: TVS → QTR
Option 3: TWU → QTR
Option 4: TWU → PTQ
Hence, the correct answer is Option 3.

Q55. Answer: (d) JMQ

The logic followed here is based on the alphabetical position pattern:
Option 1: YBG
Option 2: ILQ
Option 3: CFK
Option 4: JMQ
Thus, JMQ does not follow the pattern.
Hence, the odd one out is Option 4.

Q56. Answer: (b) Four

The logic followed here is:
Given: A, B, C, D, E and F sit around a circular table facing the centre.
D sits third to the right of C.
A sits second to the left of C.
E sits second to the right of F.
B sits to the immediate right of E.
Between A and F, the people are 4 people.
Hence, the correct answer is "Option 2".

Q57. Answer: (d) SLO

The logic followed here is:
So, 'SLO' will replace the question mark in the given series.
Hence, the correct answer is "Option 4".

Q58. Answer: (d) One

Given: Five people A, B, C, D and E are sitting in a row facing north.
Only two people sit between A and D.
B is at the third position from the extreme left.
B is immediate right of A.
B is immediate left of E.
So, exactly one person sits between E and A.
Hence, the correct answer is "Option 4".

Q59. Answer: (c) 1

Given:
‘AUTO’ is coded as ‘2683’
‘TOUR’ is coded as ‘8136’
So, R = 1
Hence, the correct answer is "Option 3".

Q60. Answer: (a) 29

The logic followed here is:
thus, "29" will replace the question mark in the given series.
Hence, the correct option is "Option 1"

Q61. Answer: (a) 6

Given: (Left) 4 8 @ 3 € 8 & 6 * 6 © 6 $ £ & 5 7 $ $ # 8 $ (Right)
Now,

YourMockTest.com — Free Study Material

Numbers, which are immediately preceded by a symbol and also immediately followed by a symbol.
So, Needed pattern is: Symbol - Number - Symbol
(Left) 4 8 @ 3 € 8 & 6 * 6 © 6 $ £ & 5 7 $ $ # 8 $ (Right)
So, Only six numbers satisfy the condition.
Hence, the correct answer is Option 1.

Q62. Answer: (b) More than three

Given: (Left) 4 2 1 5 7 9 8 5 3 6 2 1 5 7 3 7 8 4 3 6 9 7 4 5 2 4 1 (Right)
Now,
We need to find even digits which are immediately preceded by an even digit and also immediately followed by an odd digit.
So, needed pattern is: Even - Even - Odd
(Left) 4 2 1 5 7 9 8 5 3 6 2 1 5 7 3 7 8 4 3 6 9 7 4 5 2 4 1 (Right)
So, total valid occurrences = 4
Hence, the correct answer is Option 2.

Q63. Answer: (a) 93 km towards the north

Given:
Vikas drives 81 km South.
He turns right → 77 km West.
He turns right → 27 km North.
He turns right → 35 km East.
He turns right → 39 km South.
He turns left → 42 km East and reaches point Z.
Therefore, to reach Point Y again, Vikas must travel 93 km towards the North.
Hence, the correct answer is "Option 1".

Q64. Answer: (c) GCF 68

The logic followed here is:
So, 'GCF 68' will replace the question mark in the given series.
Hence, the correct answer is "Option 3"

Q65. Answer: (d) 34

BODMAS Table:
Given equation: (84 A 12) B 5 C 13 B 2 D 11 B 5 C 28 = ?
Now, replacing the symbols as:

Symbol	A	B	C	D
Replaced by	÷	×	•	−

=> (84 ÷ 12) × 5 + 13 × 2 − 11 × 5 + 28 = ?
=> 7 × 5 + 13 × 2 − 11 × 5 + 28 = ?
=> 35 + 26 − 55 + 28 = ?
=> 61 − 55 + 28 = ?
=> 6 + 28 = ?
=> 34
Hence, the correct answer is Option 4.

Q66. Answer: (b) (6, 15, 26)

The logic followed here is:
Logic:
=> First Number + 9 = Second Number
=> Second Number + 11 = Third Number
For, (5, 14, 25)
=> 5 + 9 = 14

=> 14 + 11 = 25
For, (4, 13, 24)
=> 4 + 9 = 13
=> 13 + 11 = 24
Now, checking the options using the same pattern:
Option 1) (8, 17, 6)
=> 8 + 9 = 17
=> 17 + 11 = 28 ≠ 6
Option 2) (6, 15, 26)
=> 6 + 9 = 15
=> 15 + 11 = 26
Option 3) (10, 31, 42)
=> 10 + 9 = 19 ≠ 31
Option 4) (9, 18, 23)
=> 9 + 9 = 18
=> 18 + 11 = 29 ≠ 23
Hence, the correct answer is Option 2.

Q67. Answer: (c) Two

The logic followed here is:
Given number: 21786539
Original number: 2 1 7 8 6 5 3 9
Arranging in ascending order: 1 2 3 5 6 7 8 9
The digits that remain unchanged are 6 and 9.
Therefore, the number of unchanged digits = 2
Hence, the correct answer is Option 3.

Q68. Answer: (d) 12

The logic followed here is:
thus, "12" will replace the question mark in the given series.
Hence, the correct option is "Option 4"

Q69. Answer: (a) 25

Given:
Total number of people = 54
Mr. Memi is 21st from the left end
Mr. Akte is 8th from the right end
Now, Sum = 21 + 8 = 29
Number of people between = Total − (Left position + Right position)
= 54 − 29
= 25
Therefore, 25 people sit between Mr. Akte and Mr. Memi.
Hence, the correct answer is Option 1.

Q70. Answer: (c) Father's brother

Family Chart:
Decoding the Symbols:

Symbol	•	#	&	%
Meaning	Husband of	Brother of	Mother of	Sister of

Given: F # N + O & V % E
It means: F is the brother of N, N is the husband of O, O is the mother of V, and V is the sister of E.
So, F the father’s brother of E.

Hence, the correct answer is Option 3.

Q71. Answer: (c) Both Conclusions I and II follow

Given Statements:

Some hydrogens are oxygens.

All oxygens are nitrogens.

All nitrogens are carbons.

The least possible Venn diagram for the given statements is:

Conclusions:

I. All oxygens are carbons – Follows (All oxygens are nitrogens and all nitrogens are carbons. Therefore, all oxygens are definitely carbons.)

II. Some nitrogens are hydrogens – Follows (Some hydrogens are oxygens, and all oxygens are nitrogens. Therefore, some nitrogens are definitely hydrogens.)

So, both conclusions I and II follow.

Hence, the correct answer is "Option 3".

Q72. Answer: (d) 7 km to the south

Given:

Kartik drives 9 km East.

He turns right → 5 km South.

He turns right → 11 km West.

He turns right → 12 km North.

He turns right → 2 km East and reaches point P.

Therefore, to reach Point A again, Kartik must travel 7 km towards the South.

Hence, the correct answer is "Option 4".

Q73. Answer: (d) GE−ZA

The logic followed here is based on the alphabetical position pattern:

Option 1: SQ−MK

Option 2: CA−WU

Option 3: MK−GE

Option 4: GE−ZA

Thus, GE−ZA does not follow the pattern.

Hence, the odd one out is Option 4.

Q74. Answer: (c) JPWF

The logic followed here is:

For, JTUB → HRSZ

Now, for MXNP → KVLN

Now, applying the same logic for LRYH:

So, LRYH → JPWF

Hence, the correct answer is "Option 3".

Q75. Answer: (b) de

Given:

‘go there now’ is coded as ‘lb gt de’

‘go to school’ is coded as ‘kj ft de’

So, go = de

Hence, the correct answer is "Option 2".

Q76. Answer: (d) Three

Given: Seven friends L, M, N, O, Q, R and S are sitting in a straight line facing north.

No one sits to the right of S.

S sits immediately to the right of Q.

YourMockTest.com — Free Study Material

Only three people sit between S and N.
R sits third to the left of M.
O sits to the immediate right of M.
Between them are 3 people.
Hence, the correct answer is "Option 4".

Q77. Answer: (c) More than three

Given: (Left) D M X A G N R L W O T P Y E F Q K Z J V U H (Right)
Vowels: A, E, I, O, U
We need consonants that are: Consonant → Consonant → Vowel
So, the valid groups are MXA, LWO, PYE, and JVU.
Total number of such cases = 4
Hence, the correct answer is Option 3.

Q78. Answer: (d) 92

The logic followed here is:
thus, "92" will replace the question mark in the given series.
Hence, the correct option is "Option 4".

Q79. Answer: (b) Two

The logic followed here is:
Given numbers: 654, 842, 684, 714, 385
Arranging in ascending order: 385, 654, 684, 714, 842
Now comparing positions:
The numbers that remain in the same position are 684 and 714.
Therefore, the number of unchanged positions = 2
Hence, the correct answer is Option 2.

Q80. Answer: (d) 9

BODMAS Table:
Given equation: 12 C 52 A 13 B 7 D 31 = ?
Now, replacing the symbols as:

Symbol	A	B	C	D
Replaced by	÷	×	•	−

=> 12 + 52 ÷ 13 × 7 − 31 = ?
=> 12 + 4 × 7 − 31 = ?
=> 12 + 28 − 31 = ?
=> 40 − 31 = ?
=> 9
Hence, the correct answer is Option 4.

Q81. Answer: (a) Technology for Risk Reduction – For a Safer Nation

The correct answer is Technology for Risk Reduction – For a Safer Nation.
Key Points
• The National Disaster Management Authority (NDMA) observed its 21st Formation Day on 26 September 2025.
• The specific theme for the 2025 celebration was “Technology for Risk Reduction – For a Safer Nation”, emphasizing the pivotal role of modern scientific advancements in mitigating the impact of natural and man-made calamities.
• This theme underscores the integration of Artificial Intelligence (AI), remote sensing, Geographic Information Systems (GIS), and Big Data analytics to improve disaster preparedness and response mechanisms across India.
• The event serves as a platform for stakeholders to discuss the implementation of Early Warning Systems (EWS) and the development of disaster-resilient infrastructure using high-end engineering technologies.
• By focusing on technology, the NDMA aims to minimize the loss of life and property through precise forecasting and real-time monitoring of hazards such as cyclones, floods, and earthquakes. Hence, the correct answer is Technology for Risk Reduction –

YourMockTest.com — Free Study Material

For a Safer Nation.

Additional Information

• About NDMA:

• The National Disaster Management Authority (NDMA) is the apex statutory body for disaster management in India.

• It was formally constituted on 27 September 2006, in accordance with the Disaster Management Act, 2005.

• The Prime Minister of India serves as the ex-officio Chairperson of the NDMA.

• The primary mandate of the authority is to lay down policies, plans, and guidelines for disaster management to ensure a timely and effective response.

• Institutional Framework:

• The Ministry of Home Affairs (MHA) is the nodal ministry for the management of natural disasters in India.

• The National Disaster Response Force (NDRF) is the specialized multi-disciplinary force that works under the NDMA for rescue and relief operations during emergencies.

• At the state and district levels, the framework is replicated through the State Disaster Management Authorities (SDMAs) and District Disaster Management Authorities (DDMAs).

Important Points

• Historical Context: The Disaster Management Act was enacted by the Parliament of India following the devastating 2004 Tsunami, highlighting the need for a proactive rather than reactive approach to disasters.

• Technological Tools in India: Initiatives like the Sachet portal for early warnings and Bhuvan (the geo-platform of ISRO) are critical tools used by the NDMA for vulnerability mapping and risk assessment.

• Global Alignment: The theme “Technology for Risk Reduction” aligns with the Sendai Framework for Disaster Risk Reduction (2015-2030), which India is a signatory to, promoting the use of science and technology in understanding disaster risk.

• Functions of NDMA: Apart from policy making, it approves the National Plan and assists State Authorities in formulating their own disaster management strategies.

Q82. Answer: (a) Holambi Kalan

The correct answer is Holambi Kalan.

Key Points

• The Delhi Government approved the development of India’s first electronic waste (e-waste) eco-park at Holambi Kalan in North West Delhi.

• Spanning across approximately 21 acres, the facility is designed to be a state-of-the-art hub for the scientific disposal and recycling of electronic waste.

• The park aims to address the growing issue of e-waste by integrating the informal sector into a formal, regulated framework, ensuring safe handling of hazardous materials.

• It functions as an integrated center where dismantling, refurbishing, and material recovery take place under one roof, serving as a model for sustainable urban development in India.

• This initiative was officially announced and approved by the Delhi Cabinet in February 2022 to mitigate the environmental risks posed by the massive amount of e-waste generated in the national capital.

Additional Information

• Understanding E-Waste:

• Electronic waste includes discarded computers, smartphones, televisions, refrigerators, and circuit boards that have reached the end of their useful life.

• India is currently the third-largest producer of e-waste in the world, following China and the USA.

• Delhi alone produces roughly 2 lakh tonnes of e-waste annually, which accounts for nearly 9.5% of the total e-waste generated in the country.

• Components of the Eco-Park:

• The Holambi Kalan facility will house specialized units for pre-processing, metal extraction, and refining.

• It will focus on recovering valuable resources such as gold, silver, copper, and aluminum from electronic components, which otherwise end up in landfills.

• The park will also include training centers for workers to learn modern and safe recycling techniques.

Important Points

• Environmental and Health Safety:

• E-waste contains toxic substances like lead, mercury, cadmium, and brominated flame retardants which can cause severe health issues and soil contamination if not handled properly.

• By moving recycling to a regulated eco-park, the government ensures that these toxins do not leach into the groundwater or pollute the atmosphere during processing.

• Regulatory Framework:

• The management of such waste is governed by the E-Waste (Management) Rules, 2016, and the revised 2022 rules, which emphasize Extended Producer Responsibility (EPR).

• Under EPR, manufacturers and producers are held accountable for the end-of-life management of the electronic products they place on the market.

• The Delhi State Pollution Control Committee (DPCC) plays a crucial role in monitoring the standards and operations within such environmental projects.

Q83. Answer: (b) Odisha

The correct answer is Odisha.

Key Points

• According to the Fiscal Health Report for the financial year 2022-23, Odisha has been recognized for its exceptional performance in fiscal management, often ranking at the top in terms of fiscal sustainability and prudence.

• The index evaluates states based on four critical fiscal parameters: fiscal deficit, own tax revenue, state debt as a percentage of GSDP, and interest payments as a percentage of revenue receipts.

• For FY 2022-23, Odisha demonstrated a robust debt-to-GSDP ratio and effectively managed its fiscal deficit within the limits prescribed by the Fiscal Responsibility and Budget Management (FRBM) Act. Hence, the correct answer is Odisha.

• While Maharashtra and Chhattisgarh were also high performers, Odisha stood out due to its high capital expenditure and low interest burden relative to its total revenue.

• The NITI Aayog and other financial analysts utilize these indices to provide a comparative analysis of how Indian states manage their finances and resources to ensure long-term economic stability.

Additional Information

• Parameters of Fiscal Health:

• Fiscal Deficit: This represents the gap between the government's total expenditure and its total receipts (excluding borrowings). A lower deficit indicates better health.

• Own Tax Revenue: This is the revenue generated by the state through its own taxes (like SGST, excise duty, and stamp duty) without relying on central transfers.

• Debt-to-GSDP Ratio: This ratio compares a state's public debt to its Gross State Domestic Product (GSDP). It is a key indicator of a state's ability to pay back its debts.

• Interest Payments: The percentage of revenue used to pay interest on previous loans. High interest payments can limit the funds available for developmental projects.

• NITI Aayog (National Institution for Transforming India):

• Established on January 1, 2015, it replaced the Planning Commission.

• It serves as the premier policy think tank of the Government of India, providing both directional and policy inputs.

• The Prime Minister serves as the Ex-officio Chairperson, while the Vice-Chairperson is appointed by the Prime Minister.

• Comparative Rankings:

• In various fiscal reports for FY23, Maharashtra often occupied the first position in overall economic size, but Odisha was frequently hailed for fiscal discipline.

• States like Gujarat and Karnataka generally perform well in Own Tax Revenue due to high industrialization and service sector growth.

• Conversely, states like West Bengal, Punjab, and Kerala have often been flagged for high debt levels and fiscal stress.

Important Points

• FRBM Act, 2003: The Fiscal Responsibility and Budget Management Act was enacted to institutionalize financial discipline, reduce India's fiscal deficit, and improve public funds management.

• Finance Commission: The 15th Finance Commission, chaired by N.K. Singh, provided recommendations for the devolution of taxes from the Centre to the States for the period 2021-22 to 2025-26.

• Article 293: Under the Constitution of India, this article deals with borrowing by States. It stipulates that a State may not raise any loan without the consent of the Government of India if there is still outstanding any part of a loan made to the State by the Central Government.

Q84. Answer: (b) Rs. 500 crore

The correct answer is Rs. 500 crore.

Key Points

• On 11 March 2025, Union Finance Minister Nirmala Sitharaman announced the establishment of a corpus for a contingency fund in Manipur.

• The announcement was made during the discussion and subsequent passing of the ‘Manipur Appropriation Bill, 2025’ and ‘The

Manipur Appropriation (Vote on Account) Bill, 2025' in the Lok Sabha.

• The corpus amount designated for this contingency fund is Rs. 500 crore, aimed at providing the state government with the necessary liquidity to meet unforeseen and urgent expenditures.

• The Finance Minister highlighted that this fund is crucial for maintaining administrative stability and ensuring that essential services are not disrupted due to financial constraints in the state.

• This move comes as part of the Union Government's efforts to support Manipur during its reconstruction and stabilization phase, ensuring that immediate fiscal needs are addressed without delay.

Additional Information

• Manipur Appropriation Bill, 2025:

• This bill authorizes the government to withdraw specific sums from the Consolidated Fund of Manipur for the service of the financial year 2025-26.

• In the absence of a functional State Legislative Assembly or under President's Rule, the Parliament exercises the power to pass the budget and appropriation bills for the state.

• Vote on Account:

• A Vote on Account is a grant in advance to allow the government to cover its expenditure for a part of the financial year until the full budget and Appropriation Bill are passed.

• It ensures that the machinery of the state continues to function even if the detailed discussion on the budget takes longer than expected.

• Fiscal Support for Manipur:

• The Union Government has been providing special financial assistance to Manipur to handle security, relief, and rehabilitation efforts following the socio-political challenges in the region.

• The Rs. 500 crore fund is a specific allocation over and above the regular budgetary allocations to create a safety net for the state's finances.

Important Points

• Constitutional Provisions:

• Article 267(2) of the Constitution of India empowers the State Legislature to establish a Contingency Fund of the State.

• This fund is placed at the disposal of the Governor of the state to enable advances to be made for meeting unforeseen expenditure, pending authorization of such expenditure by the State Legislature.

• Appropriation Bill Process:

• Under Article 204 (for states) and Article 114 (for the Union), no money can be withdrawn from the Consolidated Fund except under appropriation made by law.

• Since Manipur's budget was presented in the Lok Sabha, the Finance Minister steered the legislative process to ensure the financial year 2025-26 begins with adequate funding for the state.

• Role of the Lok Sabha:

• The Lok Sabha has the primary authority over Money Bills and Appropriation Bills. Once passed by the Lok Sabha, these bills are sent to the Rajya Sabha for its recommendations.

Q85. Answer: (d) World Bank Group

The correct answer is World Bank Group.

Key Points

• The Global Economic Prospects (GEP) is a flagship report issued by the World Bank Group that examines global economic developments and prospects, with a special focus on emerging market and developing economies (EMDEs).

• It is published twice a year, typically in January and June. The report issued in June 2025 continues the tradition of providing comprehensive forecasts for global growth, inflation, and trade.

• The GEP serves as a vital tool for policymakers and investors by identifying downside risks such as geopolitical instability, high debt levels, and financial market volatility.

• The report often includes analytical chapters on topical issues, such as the impact of interest rate cycles, investment trends, and the economic consequences of climate change on developing nations.

• By providing data-driven insights and forecasts for over 150 countries, the World Bank helps guide international development strategies and poverty reduction efforts.

Additional Information

• World Bank Group:

• Established in 1944 at the Bretton Woods Conference, it is headquartered in Washington, D.C., United States.

• It comprises five institutions, including the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA).

• Its primary goals are to end extreme poverty and promote shared prosperity by providing loans, grants, and technical assistance to low and middle-income countries.

• International Monetary Fund (IMF):

• While often confused with the World Bank, the IMF publishes the World Economic Outlook (WEO) and the Global Financial Stability Report.

• The IMF focuses primarily on macroeconomic stability, exchange rate regimes, and providing temporary financial assistance to countries facing balance of payments crises.

• Asian Development Bank (ADB):

• Founded in 1966 and based in Manila, Philippines, the ADB focuses on the Asia-Pacific region.

• Its flagship publication is the Asian Development Outlook (ADO), which provides economic analysis and growth projections specifically for Asian economies.

• World Economic Forum (WEF):

• An international non-governmental organization based in Cologny, Switzerland, famous for its annual meeting in Davos.

• It publishes the Global Risks Report and the Global Competitiveness Report, focusing on public-private cooperation and global governance.

Important Points

• The World Bank also publishes the World Development Report (WDR), which is an annual guide to the economic, social, and environmental state of the world today.

• As of 2024-2025, the World Bank is led by President Ajay Banga, who has emphasized climate finance and private sector mobilization as key pillars of the bank's evolution roadmap.

• The GEP report is distinct from the Global Financial Development Report, another World Bank publication that focuses specifically on the financial sector's role in development.

Q86. Answer: (c) ASEAN-China Summit

The correct answer is ASEAN-China Summit.

Key Points

• The ASEAN-China Summit involving regional leaders from East and Southeast Asia was scheduled to be held in Kuala Lumpur, Malaysia, on 26–27 May 2025.

• This high-level meeting is a cornerstone of Malaysia's tenure as the ASEAN Chair for the year 2025, having officially taken over the leadership from Laos.

• The summit focuses on deepening the Comprehensive Strategic Partnership between the Association of Southeast Asian Nations (ASEAN) and the People's Republic of China, which was established in 2021.

• Discussions during the May 2025 session primarily centered on the finalization of the ASEAN-China Free Trade Area (ACFTA) 3.0 Upgrade, aimed at boosting trade in digital technology and green energy. Hence, the statement regarding the summit type and location is correct.

• Security and maritime cooperation, specifically the negotiation for a Code of Conduct (CoC) in the South China Sea, remained a critical agenda item to maintain regional stability and freedom of navigation.

Additional Information

• Malaysia's ASEAN Chairmanship 2025:

• Malaysia officially assumed the ASEAN Chairmanship on January 1, 2025.

• The theme for the 2025 summits is "Inclusivity and Sustainability," reflecting Malaysia's commitment to equitable economic growth across the 10 member states.

• The Kuala Lumpur summits in 2025 are significant as they mark the transition toward the ASEAN Community Vision 2045.

• East Asia Summit (EAS):

• The East Asia Summit is a premier leaders-led forum for strategic dialogue and cooperation on political, security, and economic issues in the Indo-Pacific region.

• It includes 18 participating countries: the 10 ASEAN member states plus Australia, China, India, Japan, New Zealand, the Republic of Korea, Russia, and the United States.

• While related, the EAS is typically held later in the year, usually in the fourth quarter, alongside the main ASEAN Summit.

• Asia-Pacific Economic Cooperation (APEC) 2025:

• The APEC Summit is a separate inter-governmental forum for 21 member economies in the Pacific Rim.

• In 2025, the APEC host is the Republic of Korea (South Korea), not Malaysia.

Important Points

• Economic Impact: China has remained ASEAN's largest trading partner for over 15 consecutive years, while ASEAN has been China's top trading partner since 2020.

• RCEP Integration: The ASEAN-China Summit also serves to review the implementation of the Regional Comprehensive Economic Partnership (RCEP), which entered into force in 2022 and includes China and all ASEAN members.

• Connectivity: A major part of the ASEAN-China dialogue involves the synergy between the Master Plan on ASEAN Connectivity (MPAC) 2025 and China's Belt and Road Initiative (BRI).

• Historical Context: ASEAN was founded on 8 August 1967 with the signing of the Bangkok Declaration. Its current members include Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam, with Timor-Leste as an observer.

Q87. Answer: (b) 2.3%

The correct answer is 2.3%.

Key Points

• According to the World Bank's Poverty and Equity Brief Report 2025, India has demonstrated a significant decline in extreme poverty over the last decade.

• The extreme poverty rate in India, measured using the international poverty line of $2.15 per person per day (at 2017 PPP), fell to 2.3% in the year 2022-23.

• In the 2011-12 period, the extreme poverty rate was recorded at 16.2%, highlighting a sharp reduction in the proportion of the population living in absolute deprivation.

• The data used in this brief is primarily based on the Household Consumption Expenditure Survey (HCES) for 2022-23, which was released by the National Sample Survey Office (NSSO) under the Ministry of Statistics and Programme Implementation (MoSPI).

• This trend indicates that India is moving closer to achieving the Sustainable Development Goal 1 (SDG 1) of ending poverty in all its forms by 2030.

Additional Information

• International Poverty Line:

• The World Bank updated the global extreme poverty line to $2.15 in September 2022, replacing the previous $1.90 line. This change was based on 2017 Purchasing Power Parity (PPP) to reflect changes in the cost of living across countries.

• Household Consumption Expenditure Survey (HCES) 2022-23:

• This survey was crucial as it provided official consumption data for India after a gap of 11 years. It used a revamped methodology, including multiple visits to households and a modernized questionnaire, to capture consumption patterns accurately.

• Multidimensional Poverty Index (MPI):

• Apart from income-based poverty, NITI Aayog tracks Multidimensional Poverty in India. Their 2024 reports suggest that nearly 24.82 crore Indians escaped multidimensional poverty between 2013-14 and 2022-23.

• Gini Index and Inequality:

• The World Bank report also monitors the Gini Index, which measures consumption inequality. Recent data suggests that while poverty has decreased, consumption inequality in India has shown signs of stabilization, with the Gini coefficient in rural areas declining more noticeably than in urban areas.

Important Points

• Social Welfare Schemes: Large-scale government interventions such as the Pradhan Mantri Garib Kalyan Anna Yojana (PM-GKAY), which provides free foodgrains to approximately 80 crore beneficiaries, have played a vital role in cushioning the vulnerable population from extreme poverty, especially during the COVID-19 pandemic.

• Purchasing Power Parity (PPP): The calculations utilize 2017 PPP dollars, which is a spatial price index that allows for the comparison of the real value of currencies across different countries, neutralizing the effect of price level differences.

• Regional Variations: While the national average stands at 2.3%, the World Bank notes that poverty reduction has been widespread, though specific states in the BIMARU region continue to require targeted policy interventions to sustain these gains.

Q88. Answer: (a) Dharali

The correct answer is Dharali.

Key Points

• On 5 August 2025, the village of Dharali, located in the Uttarkashi district of Uttarakhand, witnessed severe devastation due to a cloudburst and subsequent flash flood.

• The cloudburst occurred in the higher reaches of the mountains, causing the Kheer Ganga (a local rivulet) to overflow with massive amounts of debris and sludge, which entered the residential and commercial areas of Dharali.

• Dharali is a prominent village situated in the Harsil valley on the banks of the Bhagirathi River, approximately 20 kilometers before the Gangotri shrine. Hence, the correct answer is Dharali.

• The flash flood caused significant damage to the Gangotri National Highway (NH-108), cutting off connectivity to the border areas and the holy shrine, while also damaging local apple orchards, which are the primary source of livelihood for the villagers.

YourMockTest.com — Free Study Material

• Rescue operations were promptly initiated by the State Disaster Response Force (SDRF) and local administration to evacuate residents and pilgrims stranded in the Harsil and Dharali regions.

Additional Information

• Cloudbursts in the Himalayas:

• A cloudburst is a localized weather phenomenon characterized by an unexpected and very heavy rainfall, usually exceeding 100 mm per hour over a small geographical area (approx. 20-30 sq km).

• In Uttarakhand, the complex topography of the Himalayas often traps moisture-laden winds, leading to rapid condensation and intense spells of rain during the monsoon months of July and August.

• Geographical Context of Options:

• Pangot: It is a world-renowned bird-watching destination located near Nainital at an altitude of about 1,983 meters. It was not the site of the 2025 Uttarkashi disaster.

• Kanatal: This is a quiet hill station located in the Tehri Garhwal district on the Mussoorie-Chamba road, known for its views of the Shivalik range.

• Bhowali: Situated at an elevation of 1,706 meters, it is a major fruit market and town in the Nainital district, serving as a gateway to the Kumaon region.

• Uttarkashi District:

• Uttarkashi, often called "Kashi of the North," is a border district of Uttarakhand that shares its boundary with Tibet (China).

• It is the source of two of India's holiest rivers: the Ganga (at Gangotri) and the Yamuna (at Yamunotri).

• The region is highly vulnerable to seismic activity (falling in Zone V) and extreme weather events like landslides and glacial lake outburst floods (GLOFs).

• Disaster Management:

• The Uttarakhand State Disaster Management Authority (USDMA) and the India Meteorological Department (IMD) continuously monitor high-altitude weather patterns to issue early warnings for cloudbursts.

• Incidents like the one in Dharali highlight the increasing frequency of extreme weather events in the Himalayan ecosystem, often attributed to climate change and environmental degradation.

Q89. Answer: (c) Italy

The correct answer is Italy.

Key Points

• The Special Olympics World Winter Games 2025 are scheduled to be hosted in Italy, specifically centered in the Piedmont region.

• The event is set to take place from March 8 to March 16, 2025, marking a significant return of international disability sports to the Italian Alps.

• The city of Turin (Torino) serves as the primary hub for the games, utilizing world-class facilities that previously hosted the 2006 Olympic and Paralympic Winter Games.

• Approximately 2,500 athletes and 625 coaches representing 103 countries are expected to participate in this global event.

• This is the first time Italy has been selected to host the World Winter Games of the Special Olympics, further solidifying its reputation as a premier destination for winter sports and social inclusion.

Additional Information

• Sports Disciplines:

• The 2025 Games will feature eight winter sports: Alpine Skiing, Cross-Country Skiing, Snowboarding, Snowshoeing, Figure Skating, Speed Skating, Floorball, and Dance Sport.

• Dance Sport is a relatively new addition to the Special Olympics repertoire, highlighting the evolving nature of the competition.

• Key Venues:

• Competitions will be spread across several locations in Piedmont, including Bardonecchia, Sestriere, and Pragelato, which are renowned for their high-altitude terrains and snow quality.

• Impact and Inclusion:

• The Special Olympics mission is to provide year-round sports training and athletic competition for children and adults with intellectual disabilities.

• The event aims to promote the "Inclusion Revolution," using sports to break down barriers and foster a more accepting society for people of all abilities.

Important Points

• Organizational History:

• The Special Olympics was founded in 1968 by Eunice Kennedy Shriver. The first International Special Olympics Summer Games were held at Soldier Field in Chicago.

• Unlike the Paralympics, which focus on physical disabilities, the Special Olympics specifically cater to individuals with intellectual disabilities.

• Global Governance:

• The selection of Italy was finalized by the Special Olympics International (SOI) Board of Directors, recognizing Italy's robust infrastructure and commitment to the Special Olympics Italy national program.

• Future Prospects:

• The 2025 Winter Games serve as a precursor to other major sporting events in the country, including the 2026 Milano-Cortina Winter Olympics, showcasing Italy's decade of dominance in hosting global winter sports.

Q90. Answer: (a) D.Y. Chandrachud

The correct answer is D.Y. Chandrachud.

Key Points

• The book titled 'Why the Constitution Matters' is authored by Justice D.Y. Chandrachud (Dhananjaya Yeshwant Chandrachud), who served as the 50th Chief Justice of India.

• In this work, the author explores the transformative power of the Indian Constitution and how it serves as a living document that evolves with the needs of society.

• Justice D.Y. Chandrachud assumed the office of Chief Justice on 9th November 2022 and served until 10th November 2024.

• The book emphasizes the role of the judiciary in upholding constitutional morality and protecting the fundamental rights of every citizen, regardless of their background.

• It highlights the significance of Article 21 (Right to Life and Personal Liberty) and the concept of liberty, equality, and fraternity as envisioned by the Constitution's makers, including Dr. B.R. Ambedkar.

Additional Information

• D.Y. Chandrachud:

• Before becoming the CJI, he served as a judge in the Supreme Court of India and as the Chief Justice of the Allahabad High Court.

• He is noted for his landmark judgments on the Right to Privacy (Justice K.S. Puttaswamy case), the decriminalization of Section 377, and the Sabarimala verdict.

• His father, Y.V. Chandrachud, remains the longest-serving Chief Justice of India in history.

• Natwar Singh:

• K. Natwar Singh was a distinguished diplomat and former Union Minister for External Affairs.

• He is famous for his autobiography titled 'One Life is Not Enough', published in 2014, which provided insights into Indian politics and foreign policy.

• Bibek Debroy:

• He was a prominent economist and served as the Chairman of the Economic Advisory Council to the Prime Minister (EAC-PM).

• He is well-known for his English translations of the Mahabharata, the Bhagavad Gita, and the Puranas, as well as his writings on economic reforms and constitutional history.

• Arif Mohammad Khan:

• He is a veteran politician currently serving as the Governor of Kerala (appointed in September 2019).

• He is an advocate for social and religious reform within the Islamic community and is known for his role in the Shah Bano case debate during the 1980s.

Important Points

• The Constitution of India was adopted by the Constituent Assembly on 26th November 1949, a date now celebrated as Constitution Day (Samvidhan Divas).

• It came into effective force on 26th January 1950, marking the birth of the Republic of India.

• The Supreme Court of India acts as the custodian and final interpreter of the Constitution, ensuring that the legislature and executive do not exceed their constitutional limits.

• The Basic Structure Doctrine, established in the Kesavananda Bharati case (1973), ensures that the essential features of the Constitution cannot be altered by Parliament.

Q91. Answer: (c) 200 m

The correct answer is 200 m.

Key Points

• Animesh Kujur is a prominent Indian sprinter who has specialized in the 200 m track event, achieving significant milestones in the 2024 athletic season.

• During the Federation Cup 2024 held in Bhubaneswar, Odisha, Animesh Kujur clocked a remarkable time of 20.62 seconds in

the 200 m category.

• With this timing, he became the second-fastest Indian in history in the 200 m sprint, coming incredibly close to the standing national record.

• His performance at the Kalinga Stadium was a major highlight of the meet, as he broke the previous Meet Record and set a new Personal Best, which is often recognized as breaking his own previous competitive benchmarks.

• The sprinter has shown consistent growth, also performing well in the 63rd National Inter-State Senior Athletics Championships in Panchkula, where he secured a Gold medal in the same event with a time of 20.65 seconds.

Additional Information

• National Record Context: The current National Record for the men's 200 m in India is held by Amlan Borgohain, who clocked 20.52 seconds in 2022. Animesh Kujur's 20.62 seconds is the closest any Indian has gotten to this mark recently.

• Athlete Background: Animesh Kujur hails from Chhattisgarh and has been training under the Reliance Foundation Athletics High-Performance Centre. His rapid improvement has made him a key contender for international events like the Asian Games and World Athletics Championships.

• Event Characteristics: The 200 m race is a sprint event that begins on the curve of a standard 400 m track and ends on the home straight. It requires a combination of explosive acceleration and speed endurance.

• Comparison with other Events:

• 100 m: A straight-line dash where Animesh also competes, but his most significant record-threatening times have occurred in the longer sprint.

• 400 m: Known as the "quarter-mile," this event requires different physiological pacing compared to the 200 m.

• 800 m: This is a middle-distance event requiring aerobic capacity, which is outside the specialty of a pure sprinter like Kujur.

• Olympic Qualification: High-profile domestic meets like the Federation Cup and Inter-State Championships serve as crucial platforms for Indian athletes to meet the Olympic Entry Standards for the Paris 2024 Games.

Important Points

• Timing Evolution: In May 2024, Animesh's time of 20.62 seconds was significant because it surpassed the Asian Championships qualifying standard set by the Athletics Federation of India (AFI).

• Governance: Athletics in India is governed by the Athletics Federation of India (AFI), which organizes the National Inter-State and Federation Cup events to scout and prepare talent for global stages.

• Speed Training: Athletes like Animesh Kujur utilize advanced sports science and biomechanical analysis at high-performance centers to shave milliseconds off their records in technical events like the 200 m.

Q92. Answer: (d) Reserve Bank of India

The correct answer is Reserve Bank of India.

Key Points

• The Reserve Bank of India (RBI), in its economic assessment for May 2025, confirmed that India’s industrial and services sectors continue to lead the nation's economic growth.

• The central bank highlighted that the Services sector remained the primary engine of the Gross Domestic Product (GDP), bolstered by strong domestic demand and export of services.

• The Industrial sector showed significant resilience, particularly in Manufacturing and Construction, supported by the government’s Capital Expenditure (CAPEX) initiatives and the Production Linked Incentive (PLI) schemes.

• Despite the positive trajectory in production and output, the RBI raised concerns regarding unemployment challenges, noting that the growth has not yet fully translated into proportionate job creation across all demographics.

• The RBI uses high-frequency indicators such as the Purchasing Managers' Index (PMI) and GST collections to validate these growth trends in the May 2025 report.

Additional Information

• Reserve Bank of India (RBI):

• Established on April 1, 1935, under the Reserve Bank of India Act, 1934, following the recommendations of the Hilton Young Commission.

• It was nationalized on January 1, 1949, and serves as the Central Bank of India, regulating the monetary policy and the banking system.

• The Governor of RBI (currently Shaktikanta Das as of recent years) leads the Monetary Policy Committee (MPC), which meets bi-monthly to decide on interest rates like the Repo Rate.

• Industrial and Services Sector Metrics:

• Index of Industrial Production (IIP): An index that details the growth of various sectors in the economy such as Mining, Manufacturing, and Electricity.

• PMI (Purchasing Managers' Index): An indicator of the economic health of the manufacturing and service sectors; a reading above 50 indicates expansion.

• The Services Sector in India contributes more than 50% to the Gross Value Added (GVA), making it the most dominant part of the economy.

• Unemployment and Labor Trends:

• Unemployment is often tracked via the Periodic Labour Force Survey (PLFS) conducted by the National Statistical Office (NSO) under the Ministry of Statistics and Programme Implementation.

• "Jobless growth" is a condition where the economy grows without a corresponding increase in employment opportunities, a phenomenon the RBI monitors to ensure financial stability.

Important Points

• Role of NITI Aayog: While NITI Aayog (National Institution for Transforming India) serves as the policy think-tank of the government, the RBI is the statutory body responsible for the macroeconomic data and inflation control.

• Financial Stability Report (FSR): This is a bi-annual report released by the RBI that assesses the resilience of India's financial sector and identifies risks to economic growth.

• Growth vs. Development: The RBI often distinguishes between numerical growth (GDP) and inclusive development (employment and equity), emphasizing that sustainable growth requires a robust labor market.

• Foreign Exchange Reserves: In 2025, the RBI continues to manage India’s Forex Reserves to protect the Indian Rupee (INR) against global volatility.

Q93. Answer: (d) Centre for High Energy Systems and Sciences

The correct answer is Centre for High Energy Systems and Sciences.

Key Points

• The Centre for High Energy Systems and Sciences (CHESS), located in Hyderabad, is the specialized laboratory of the Defence Research and Development Organisation (DRDO) dedicated to the development of Directed Energy Weapons (DEWs).

• In August 2025, the DRDO conducted a successful flight test of the Integrated Air Defence Weapon System (IADWS), which integrates advanced laser-based weaponry to counter aerial threats.

• CHESS has been leading the research on high-power laser systems, including the DURGA-II (Directionally Unrestricted Ray-Gun Assembly), which is a 100-kilowatt class laser weapon system.

• The Directed Energy Weapon (DEW) developed by CHESS is designed to neutralize unmanned aerial vehicles (UAVs), missile seekers, and mortar shells using concentrated electromagnetic energy.

• These systems are highly effective in modern warfare as they provide speed-of-light engagement and a low cost-per-shot compared to traditional kinetic interceptors.

• Hence, the correct answer is Centre for High Energy Systems and Sciences.

Additional Information

• Defence Research and Development Organisation (DRDO):

• It was established in 1958 and functions under the Ministry of Defence, Government of India.

• Headquartered in New Delhi, it aims to achieve self-reliance in critical defence technologies and systems.

• Research Centre Imarat (RCI):

• Located in Hyderabad, this laboratory is primarily responsible for the development of avionics systems, inertial navigation, and control systems for various missile projects.

• Defence Research and Development Laboratory (DRDL):

• Also based in Hyderabad, it is the lead laboratory for the design and development of missile systems like Agni, Akash, and Prithvi.

• Defence Research and Development Establishment (DRDE):

• Located in Gwalior, its primary focus is on the detection and protection against chemical and biological warfare agents.

Important Points

• Integrated Air Defence Weapon System (IADWS):

• The IADWS is a comprehensive air defense shield intended to protect high-value assets and metropolitan areas from a variety of aerial threats including cruise missiles and aircraft.

• The integration of DEWs into the IADWS represents a technological shift toward non-kinetic warfare, allowing for more precise and stealthy engagements.

• Key features of laser-based DEWs include a near-infinite magazine, as long as a power source is available, and the ability to target electronic components without causing large-scale physical explosions.

Q94. Answer: (d) Dheera

The correct answer is Dheera.

Key Points

• In September 2025, the female cheetah named Dheera was released into the Gandhi Sagar Wildlife Sanctuary in Madhya Pradesh as part of the ongoing Project Cheetah.

• The release of Dheera is a critical step in establishing a second meta-population of cheetahs in India, reducing the concentration of the animals solely in Kuno National Park.

• Gandhi Sagar Wildlife Sanctuary was specifically prepared with a predator-proof enclosure spanning approximately 64 square kilometers to ensure the safety and successful breeding of the translocated felines.

• The introduction of Dheera and other cheetahs to this sanctuary aims to strengthen breeding efforts and provide a diverse habitat consisting of open grasslands and dry deciduous forests, which are ideal for the species.

• This translocation is overseen by the National Tiger Conservation Authority (NTCA) in collaboration with international experts from Namibia and South Africa.

Additional Information

• Project Cheetah:

• Launched in September 2022, this is the world's first intercontinental large wild carnivore translocation project.

• The project aims to reintroduce the Asiatic Cheetah (now extinct in India) by using its close relative, the African Cheetah.

• The first batch of 8 cheetahs was brought from Namibia, followed by 12 cheetahs from South Africa in February 2023.

• Gandhi Sagar Wildlife Sanctuary:

• It is located on the northern boundary of Mandsaur and Neemuch districts in Madhya Pradesh.

• The sanctuary is bisected by the Chambal River, which provides a perennial water source for the local wildlife.

• It was selected as the second site for cheetah reintroduction due to its prey base (including Chinkara and Spotted Deer) and suitable terrain.

• Significant Cheetahs in the Project:

• Aasha: A female cheetah from Namibia known for being one of the first to successfully hunt and adapt to the Indian wild.

• Sasha: One of the initial Namibian cheetahs; unfortunately, she was the first to succumb to a kidney ailment in March 2023.

• Jwala: Noted for giving birth to the first litter of cheetah cubs born on Indian soil in over 70 years.

• Conservation Goals:

• The long-term goal is to reach a self-sustaining population of about 35 to 40 cheetahs across multiple sites in Central India.

• Reintroducing cheetahs helps in the restoration of open forest and grassland ecosystems, which supports biodiversity conservation at a larger scale.

Q95. Answer: (a) Laser Weapon

The correct answer is Laser Weapon.

Key Points

• DURGA-2, which stands for Directionally Unrestricted Ray-Gun Array, is a classified project of the Defence Research and Development Organisation (DRDO) to develop a high-power Laser Weapon.

• The project is being spearheaded by the Laser Science and Technology Centre (LASTEC), a premier laboratory based in New Delhi that specializes in Directed Energy Weapons (DEWs).

• The DURGA-2 system is designed as a 100-kilowatt, lightweight Directed Energy Weapon that can be integrated into land, sea, and air-based platforms.

• The weapon works by emitting a highly concentrated laser beam to damage or destroy targets such as Unmanned Aerial Vehicles (UAVs), ballistic missiles, and enemy fighter jets by melting their airframes or blinding their sensors.

• Unlike conventional munitions, this Laser Weapon provides a low cost per shot because it utilizes electrical energy instead of expensive physical missiles or shells.

Additional Information

• Directed Energy Weapons (DEWs):

• DEWs are systems that use concentrated electromagnetic energy or atomic particles to incapacitate or destroy enemy equipment and personnel.

• The primary types of DEWs include High-Energy Lasers (HEL) and High-Power Microwaves (HPM).

• These weapons engage targets at the speed of light, making them effective against high-speed threats like hypersonic missiles.

• KALI (Kilo Ampere Linear Injector):

• Apart from DURGA-2, India is also working on KALI, a linear accelerator being developed by DRDO and the Bhabha Atomic Research Centre (BARC).

• KALI is designed to emit powerful pulses of electrons to destroy the electronic systems of incoming missiles and aircraft.

• Global Context:

• Several countries are racing to deploy Laser Weapons, including the United States (with its Laser Weapon System - LaWS), Russia (with Peresvet), and Israel (with the Iron Beam).

• The United Kingdom recently tested its DragonFire laser system, demonstrating the tactical shift toward non-kinetic warfare.

Important Points

• Strategic Advantages: The DURGA-2 provides a stealthy engagement capability as the laser beam is invisible to the naked eye and produces no sound during firing.

• Tactical Applications: It is particularly effective for Short-Range Air Defence (SHORAD), protecting vital installations from swarms of drones which are difficult to intercept using traditional air defense systems.

• Research and Development: LASTEC has been focusing on solid-state lasers and fiber lasers to ensure the DURGA-2 system remains compact enough for mobile military trucks and naval ships.

• Power Requirements: Achieving a 100kW output is a significant milestone for India, as it provides enough thermal energy to neutralize hardened military targets at distances of several kilometers.

Q96. Answer: (a) Gateway of India

The correct answer is Gateway of India.

Key Points

• The Fit India Movement, a flagship program of the Government of India, organized the 'Sundays on Cycle' event at the historic Gateway of India in Mumbai on February 2, 2025.

• The primary objective of this event was to encourage citizens to adopt cycling as a sustainable and healthy lifestyle choice, promoting physical fitness and environmental consciousness.

• The event witnessed a massive gathering of cyclists, fitness enthusiasts, and youth icons who pedaled through the streets of South Mumbai to spread the message of a "Fit India."

• By choosing the Gateway of India, an iconic landmark completed in 1924, the organizers aimed to maximize visibility and inspire thousands of residents to participate in outdoor physical activities.

• The 'Sundays on Cycle' initiative is part of a larger series of events planned across various metropolitan cities to reclaim public spaces for health-oriented activities on weekends. Hence, the correct answer is Gateway of India.

Additional Information

• Fit India Movement:

• It was launched by Prime Minister Narendra Modi on August 29, 2019, which is celebrated as National Sports Day in India to honor the birth anniversary of hockey legend Major Dhyan Chand.

• The movement is governed by the Ministry of Youth Affairs and Sports and aims to address the rising lifestyle diseases such as diabetes and obesity by promoting daily exercise.

• Gateway of India:

• Located on the waterfront at Apollo Bunder, it is one of the most famous monuments in India and a major tourist attraction in Maharashtra.

• It was built to commemorate the visit of King George V and Queen Mary to Mumbai (then Bombay) in 1911.

• Marine Drive:

• While a popular spot for morning walks and cycling, it served as a connecting route for the event but was not the primary host landmark for the inauguration of this specific February 2025 event.

• It is a 3.6-kilometer long, C-shaped six-lane concrete road along the coast of the Arabian Sea, often called the Queen's Necklace.

Important Points

• Health Benefits of Cycling: Cycling is a low-impact aerobic exercise that improves cardiovascular health, increases muscle strength and flexibility, and reduces stress levels. It is considered one of the most effective ways to reduce carbon emissions in urban settings.

• Government Initiatives: The Ministry of Housing and Urban Affairs has also promoted the Cycles4Change Challenge to support Indian cities in implementing quick cycling-friendly interventions under the Smart Cities Mission.

• Event Impact: High-profile events like Sundays on Cycle help in the development of non-motorized transport (NMT) infrastructure, such as dedicated cycle tracks and bike-sharing systems, in crowded cities like Mumbai and Delhi.

• Year 2025 Context: The 2025 edition of the event focused on the integration of technology and fitness, encouraging participants to track their progress via the Fit India Mobile App.

Q97. Answer: (c) Held at 5.50% and maintained a 'neutral' stance

p>The correct answer is Held at 5.50% and maintained a 'neutral' stance.

Key Points

• The Monetary Policy Committee (MPC) of the Reserve Bank of India (RBI) concluded its meeting in October 2025 with a decision to keep the policy repo rate unchanged at 5.50%. This decision reflects the committee's assessment of the prevailing macroeconomic conditions and inflation outlook.

• In a significant move regarding the future path of monetary policy, the RBI decided to maintain a 'neutral' stance. A neutral stance provides the central bank with the flexibility to move interest rates in either direction depending on incoming economic data regarding price stability and growth. Hence, the statement regarding holding the rate at 5.50% and a neutral stance is correct.

• The MPC decision to hold the rate was supported by a majority of the members, emphasizing the need to ensure that inflation aligns with the 4% target on a durable basis while supporting the economic recovery.

• Following the repo rate decision, the Standing Deposit Facility (SDF) rate remained at 5.25%, and the Marginal Standing Facility (MSF) rate and the Bank Rate were maintained at 5.75%.

• The Reserve Bank continues to monitor the impact of previous rate cycles on the economy, particularly the transmission of rates to commercial bank lending and deposit portfolios.

Additional Information

• Policy Repo Rate: It is the fixed interest rate at which the Reserve Bank provides overnight liquidity to banks against the collateral of government and other approved securities under the Liquidity Adjustment Facility (LAF). It is the primary tool used to control inflation.

• Monetary Policy Committee (MPC): It is a six-member committee constituted by the Central Government under Section 45ZB of the RBI Act, 1934. The committee consists of three members from the RBI (including the Governor as the ex-officio Chairperson) and three external members.

• Inflation Targeting: The RBI operates under a Flexible Inflation Targeting (FIT) framework. The target is set at 4% with a tolerance band of +/- 2% (i.e., 2% to 6%). The Consumer Price Index (CPI) is the primary measure used to track retail inflation in India.

• Types of Policy Stances:

• Accommodative Stance: Suggests the central bank is prepared to cut rates to expand money supply and boost growth.

• Hawkish Stance: Indicates a focus on curbing inflation, often leading to interest rate hikes.

• Neutral Stance: Indicates the central bank is open to moving rates in either direction or keeping them stable based on data.

• Withdrawal of Accommodation: Implies a gradual reduction of liquidity and potentially rising rates to normalize the policy.

Important Points

• The Role of the RBI Governor: The Governor of the Reserve Bank of India has a casting vote in the event of a tie in the MPC voting process.

• Impact on Borrowers: When the RBI holds the repo rate, the External Benchmark Linked Lending Rates (EBLR) usually remain stable, meaning Equated Monthly Installments (EMIs) for home loans and car loans are likely to remain unchanged in the short term.

• Frequency of Meetings: The MPC is required to meet at least four times a year, though it typically meets bi-monthly (every two months) to review the monetary policy.

• Statutory Basis: The Monetary Policy framework was modernized following the Urjit Patel Committee recommendations and the subsequent amendment to the RBI Act in 2016.

Q98. Answer: (b) Two

The correct answer is Two.

Key Points

• As of July 2025, only two Indian cricketers have been nominated for the prestigious Laureus World Sports Awards.

• Sachin Tendulkar became the first Indian cricketer to be nominated and win a Laureus award. He won the Laureus Sporting Moment (2000–2020) award in February 2020.

• The nomination for Sachin Tendulkar was based on the iconic moment titled "Carried on the Shoulders of a Nation," referring to India's 2011 ICC Cricket World Cup victory.

• Rishabh Pant is the second Indian cricketer to receive a nomination. He was nominated for the 2025 Laureus World Comeback of the Year award.

• Rishabh Pant's nomination follows his remarkable recovery and return to professional cricket in 2024 after surviving a near-fatal car accident in December 2022.

• The inclusion of Rishabh Pant in the 2025 shortlist highlights his successful stint in the IPL 2024 and his pivotal role in India’s T20 World Cup 2024 triumph.

Additional Information

• Laureus World Sports Awards:

• Established in 1999 by founding patrons Daimler and Richemont, these awards are often referred to as the "Oscars of Sport."

• The first ceremony was held on May 25, 2000, in Monte Carlo, with a keynote speech delivered by Nelson Mandela.

• The awards celebrate sporting excellence across various categories, including Sportsman of the Year, Sportswoman of the Year, Team of the Year, and Breakthrough of the Year.

• Indian Athletes at Laureus:

• While only two cricketers have been nominated, other Indian athletes have received recognition. Vinesh Phogat (Wrestling) was the first Indian athlete to be nominated for the Laureus World Comeback of the Year in 2019.

• Neeraj Chopra (Javelin Throw) was nominated for the Laureus World Breakthrough of the Year award in 2022 following his Tokyo Olympics gold medal.

• The awards are adjudicated by the Laureus World Sports Academy, a group of over 70 living sporting legends.

Important Points

• Significance of the 2025 Nomination:

• The 2025 Laureus World Comeback of the Year nomination for Rishabh Pant places him alongside global icons who have overcome significant physical or personal adversity.

• Pant made his return to competitive cricket during the Indian Premier League (IPL) in March 2024, after a hiatus of nearly 15 months involving multiple surgeries and intensive rehabilitation.

• His performance in the ICC T20 World Cup 2024, where India emerged as Champions, was a critical factor in his international recognition.

• Sachin Tendulkar's Legacy:

• The Sporting Moment award won by Sachin Tendulkar in 2020 was unique as it was decided by a global fan vote, showcasing his massive popularity nine years after the event took place.

• The moment captured the Indian cricket team carrying Tendulkar on their shoulders at the Wankhede Stadium after winning the World Cup.

Q99. Answer: (c) Issue advisory against FPI-linked schemes

The correct answer is Issue advisory against FPI-linked schemes.

Key Points

• On 22 August 2025, the Securities and Exchange Board of India (SEBI) issued a formal advisory warning the public against fraudulent investment schemes that claim to offer high returns through Foreign Portfolio Investor (FPI) investment routes.

• The regulator observed that fraudsters were increasingly using social media platforms such as WhatsApp, Telegram, and Instagram to lure retail investors into scams by promising "special" or "institutional" access to the stock market.

• These schemes often falsely claim to provide retail individuals with benefits typically reserved for Institutional Investors, such as guaranteed IPO allotments and sophisticated trading tools, which are not legally available to common retail participants through these channels. Hence, the correct action was issuing an advisory.

• SEBI highlighted that scammers often impersonate registered Investment Advisers or Research Analysts to gain credibility, using forged documents and fake apps to show non-existent profits.

• The advisory explicitly states that FPI investment is a highly regulated category and cannot be accessed by individual retail investors through unregulated social media groups or mobile applications.

Additional Information

• Securities and Exchange Board of India (SEBI):

• It is the statutory regulatory body established on April 12, 1992, in accordance with the provisions of the SEBI Act, 1992.

• Its primary function is to protect the interests of investors in securities and to promote the development and regulation of the Indian securities market.

• Headquartered in Mumbai, it oversees stock exchanges, brokers, and various financial intermediaries.

• Foreign Portfolio Investment (FPI):

• FPI refers to the entry of funds into a country where foreigners deposit money in a country's stock market or bond market.

• Unlike Foreign Direct Investment (FDI), FPI involves the purchase of securities that can be easily liquidated and does not provide the investor with direct control over the company.

• In India, FPIs are regulated under the SEBI (Foreign Portfolio Investors) Regulations, 2019.

• Common Red Flags in Financial Scams:

• Promises of guaranteed returns in the volatile equity market.

• Pressure to transfer funds to personal bank accounts rather than designated trading accounts.

• Offers of "exclusive" access to institutional quotas in IPOs for retail investors.

Important Points

• Verification Mechanisms: SEBI urges all investors to verify the registration status of any financial entity on its official website (www.sebi.gov.in) before making payments.

• Investor Grievance Redressal: If an investor falls victim to such a scam, they can lodge a complaint on the SCORES (SEBI Complaints Redress System) portal, which was updated to SCORES 2.0 in 2024 to enhance efficiency.

• Action against Finfluencers: In recent years, SEBI has tightened regulations regarding financial influencers (finfluencers) to prevent the spread of misleading advice on social media platforms.

• Institutional Trading: Retail investors should note that Institutional Trading Accounts require specific legal structures and cannot be opened via simple mobile apps promoted on Telegram or WhatsApp.

Q100. Answer: (b) Delivery of 250th C-130J tail assembly

The correct answer is Delivery of 250th C-130J tail assembly.

Key Points

• In December 2025, Tata Lockheed Martin Aerostructures (TLMAL) achieved a significant milestone in India's defense manufacturing sector by delivering its 250th C-130J tail assembly, also known as the empennage.

• TLMAL is a joint venture between Tata Advanced Systems Limited (TASL) and the US-based global security and aerospace leader Lockheed Martin, which was established in 2010.

• The TLMAL facility, located in Adibatla, Hyderabad, serves as the sole global production source for C-130J empennage assemblies, which are integrated into all Super Hercules aircraft produced in the United States.

• The empennage consists of the aircraft's entire tail section, including the horizontal and vertical stabilizers, as well as the leading edges and tip assemblies.

• This milestone reflects the maturity of the Indian aerospace ecosystem and the success of the Make in India initiative, as these locally manufactured components support a global fleet operated by 22 nations.

Additional Information

• C-130J Super Hercules:

• The C-130J Super Hercules is the world’s most advanced tactical airlifter, known for its versatility in combat, humanitarian aid, and disaster relief missions.

• The Indian Air Force (IAF) operates a fleet of C-130J-30s, which are used for special operations and transport in challenging terrains.

• Tata Advanced Systems Limited (TASL):

• TASL is the strategic aerospace and defense arm of the Tata Group and is a key player in India's mission to become self-reliant in defense manufacturing (Atmanirbhar Bharat).

• Beyond the C-130J project, TASL is involved in several other high-profile aerospace projects, including the C-295 transport aircraft manufacturing program.

• Growth and Export Impact:

• The TLMAL joint venture has a high export orientation, with over 90% of its manufactured components being sent to Lockheed Martin’s final assembly line in Marietta, Georgia.

• The facility reached the delivery of its 100th empennage in 2018 and its 150th in September 2021, indicating a steady increase in production efficiency over the years.

Important Points

• The TLMAL facility also hosts a specialized Metal-to-Metal Bonding facility, which was added in 2018 to enhance its technological capabilities and local content.

• This joint venture serves as a model for private sector participation in Indian defense, showcasing how global original equipment manufacturers (OEMs) can partner with Indian firms to create a robust domestic supply chain.

• By December 2025, the total number of C-130J aircraft delivered globally has expanded significantly, all featuring the critical tail assemblies manufactured in Hyderabad.

More previous year papers and mock tests: **www.yourmocktest.com/pyq**

YourMockTest.com — Free Study Material