MAT 2016 Memory Based Answer Key PDF

SECTION A : English Language

Q1 (B): The transpose of a matrix is obtained by interchanging rows and columns. Applying transpose once again restores the original matrix arrangement. Hence, $(A^T)^T = A$.

Q2 (C): A singular matrix is a matrix that does not possess an inverse. For every singular matrix, the determinant value is always equal to zero. Therefore, the correct answer is 0.

Q3 (B): The limit $\lim_{x \to 0} \frac{\sin x}{x}$ is a standard trigonometric limit. As x approaches zero, the ratio approaches the value 1. Hence, the correct option is 1.

Q4 (B): The derivative of e^{ax} with respect to x is ae^{ax}. Here, $a = 3$, therefore differentiating gives $3e^{3x}$. Thus, the required answer is $3e^{3x}$.

Q5 (B): Rank of a matrix represents the number of linearly independent rows or columns. Since every element of a zero matrix is zero, there are no independent rows. Therefore, the rank of a zero matrix is 0.

Q6 (A): Separating variables gives $\frac{dy}{y} = 2\,dx$. Integrating both sides gives $\ln y = 2x + C$. Hence, the general solution becomes $y = Ce^{2x}$.

Q7 (B): Integrating x^2 gives $\frac{x^3}{3}$. Applying the limits from 0 to 1 gives $\frac{1}{3} - 0$. Therefore, the value of the integral is $\frac{1}{3}$.

Q8 (B): One important determinant property is $\det(AB) = \det(A)\det(B)$. Thus, the determinant of a product equals the product of determinants. Hence, the correct option is $\det(A)\det(B)$.

Q9 (B): The derivative of the logarithmic function $\ln x$ follows a standard rule. Differentiating with respect to x gives $\frac{1}{x}$. Therefore, the correct answer is $\frac{1}{x}$.

Q10 (B): The term "rat race" refers to an inherently competitive environment, and seeking a "relaxed way of living" is the literal definition of a lifestyle.Therefore, option (b) is correct because it logically captures both the high-pressure nature of work and the desired alternative way of life..

Q11 (A): There is no need to add 'of' after "has been growing." We always say "although there has been a growing interest in popular fiction." Hence, option (a) is correct.

Q12 (B): We treat 'society' as a singular word or noun and use 'is' with it. The use of 'are' is incorrect here. 'Is' is used with a singular noun.

Q13 (C): 'Are' is incorrect here. 'Is' is the correct verb to be used with the word 'History,' as it is treated as a singular noun.

Q14 (D): The correct form is 'has' instead of 'have.' This is because the subject demands a singular auxiliary verb in the given context.

Q15 (C): This sentence has an error in the use of the relative pronoun 'that' before the words 'it urges them.' Since this is a non-essential clause, the relative pronoun 'which' should be used instead of 'that.'

Q16 (A): CBEAD is the correct sequence of the paragraph. Rearranging the sentences in this order gives a logically coherent and meaningful paragraph.

Q17 (A): DBEAC is the correct sequence of the paragraph. This arrangement ensures that the ideas flow in a natural and logical progression.

Q18 (A): BEACD is the correct sequence of the paragraph. Placing the sentences in this order produces the most coherent passage.

Q19 (A): CDABE is the correct sequence of the paragraph. This ordering maintains the logical continuity and thematic flow of the passage.

Q20 (C): DCBEA is the correct sequence of the paragraph. Arranging the sentences in this manner yields a well-structured and meaningful paragraph.

Q21 (B): Corruption is an immoral practice. It violates ethical norms and societal values, hence option (b) is the correct answer.

Q22 (D): In practising corruption, rules are ignored, social laws are manipulated, and favouritism is done. Hence option (d), 'all of the above,' is the correct answer.

Q23 (A): The passage explicitly states that the "devil of corruption" is so powerful that it has shattered our economy" and destroyed noble values. Therefore, (a) is the only consequence mentioned as a direct result.

Q24 (B): The people involved in corruption never think of national interest. Their actions are driven by personal gain rather than the welfare of the nation.

Q25 (C): Water pollution is caused by untreated industrial water which is discharged by industries into water bodies, making option (c) the correct answer.

Q26 (B): Carbon monoxide is the poisonous gas which causes a great danger to health. It is a product of incomplete combustion and is highly toxic when inhaled.

Q27 (C): Air and water pollution are major causes of respiratory diseases. Exposure to pollutants severely affects the lungs and the overall respiratory system.

Q28 (A): The thin layer of ozone in the atmosphere is a kind of life-giving system. It protects the Earth from harmful ultraviolet radiation emitted by the sun.

Q29 (B): The concept of *eris*, according to the ancient Greeks, is a condition of opposites. It represents the tension between contrasting forces in nature and society.

Q30 (A): In the passage, bad *eris* is defined as violent conditions of life. It refers to destructive conflict as opposed to the productive rivalry of good *eris*.

Q31 (D): Zeus married Thetis off because he did not want to father his own ruin. A prophecy stated that Thetis's son would be greater than his father, so Zeus avoided fathering her child.

Q32 (C): Zeus was of the opinion that however strong a mortal child was, he could not overthrow or kill an immortal God. This belief guided his actions in the myth.

Q33 (C): The analogy used to describe the communications network among the cells in the immune system is likened to bees swarming around a hive. This captures the coordinated and collective nature of immune cell communication.

Q34 (B): The state in which the immune system does not attack the body's own cells is known as self-tolerance. This is a crucial property for preventing autoimmune diseases.

Q35 (C): Allergen is the specific term used to refer to a substance that triggers an allergic response in the immune system of a sensitised individual.

Q36 (D): Through characteristic shapes on the antigen surface, the cells in the immune system recognise an antigen as foreign or non-self, triggering an immune response.

Q37 (B): When crows use sticks to pry peanuts out of cracks, they demonstrate the intelligence to use tools. This is considered a sign of higher cognitive ability in animals.

Q38 (A): The word 'upsurge' as used in the paragraph means an increasingly large amount. It conveys the idea of a sudden and significant rise in quantity or intensity.

Q39 (D): Chimpanzees and gorillas have been trained to use sign language or geometric shapes that stand for words, demonstrating a capacity for symbolic communication.

Q40 (B): Using cues is not considered a sign of animal intelligence. True intelligence involves problem-solving and reasoning beyond mere conditioned responses.

Section B : Intelligence and Critical Reasoning.

Q41 (A): The pattern follows a dual sequence where the numbers increase by +3 and the letters advance by +4 positions alternately across the series.

Q42 (C): The pattern follows a rule where each number is multiplied by 2 and added to an incrementing value $(+1, +2, +3, \ldots)$, while letters decrease by -2 and increase by $+3$ alternately.

Q43 (B): The pattern alternates with letters increasing by +2 and numbers following a sequence based on squares $(4^2, 8^2, 12^2, 16^2, 20^2)$ with consistent increments applied throughout the series.

Q44 (C): The pattern shows numbers increasing by $+2, +3, +4, +5$ and an additional increment of $+8, +12, +16, +20$ applied to alternate elements in the series.

Q45 (C): The pattern follows the rule $\left(\frac{\text{letter}_1 + \text{letter}_2}{2}\right) + 2 = \text{result}$, applied consistently across all pairs of letters in the series.

Q46 (C): From the given tabulated information, Akshay plays Cricket and his hobby is singing. Hence, Akshay is a singer.

Q47 (C): From the table, Dhiraj plays Hockey and his hobby is dancing. Hence, 'Hockey and dancing' is the correct relationship of the game and fine arts hobby of Dhiraj.

Q48 (C): From the table it is clear that Chanderjeet plays Cricket and is interested in painting. Hence option (c) is the correct answer.

Q49 (C): From the arrangement table, City A is associated with Blue pottery. Hence, City A is famous for blue pottery.

Q50 (D): From the arrangement table, City E is associated with Educational institutes. Hence, City E is famous for educational institutes.

Q51 (C): From the above table it is clear that City B is famous for lovely gardens, as B is mapped to 'Lovely gardens' in the given arrangement.

Q52 (C): From the seating arrangement table with Left: Dharmender, Anil, Farmaan and Right: Chander, Alexander, Brijend, the answer to question 52 is option (c).

Q53 (B): Based on the same seating arrangement table described in the solution to Q52, the answer to question 53 is option (b).

Q54 (C): Based on the same seating arrangement table described in the solution to Q52, the answer to question 54 is option (c).

Q55 (C): From the course-lecturer-month table, it is clear that the course taught by S is either C or D, as S is mapped to both March and April in the given schedule.

Q56 (A): From the table, the course of lecturer Q immediately follows after course B. Course A is taught by Q in the month of March, directly after course B taught by P in February.

Q57 (C): From the table, Course E is taught by lecturer R in the month of January. Hence, option (c) is the correct answer.

Q58 (D): From the person-profession-day table, all combinations given in the options are correct as they match the entries: Piyush–Doctor–Monday, Rajeev–Teacher–Tuesday, etc.

Q59 (A): Based on the scheduling logic, Rajeev, Sunanda, Piyush, and Urvashi are fixed to specific days; Kadir Khan and Trilochan are the only two left whose specific days (Wednesday / Saturday) are interchangeable.

Q60 (B): From the table, Sunanda is the Nurse in the family, visiting on Friday. Hence, option (b) is the correct answer.

Q61 (B): According to the given statement, only Conclusion I follows. Conclusion II cannot be independently derived from the premises provided.

Q62 (A): When Repo Rate is increased, inflation will decrease and vice-versa. So, Conclusion I does not follow; only Conclusion II follows. Hence option (a) is correct.

Q63 (B): According to the given statement, only Conclusion I follows logically. Conclusion II goes beyond what can be inferred from the given premises.

Q64 (D): Dearness Allowance (DA) is specifically designed to provide financial relief and counteract the rising cost of living caused by inflation. Consequently, both conclusions I and II logically follow the statement.

Q65 (E): The President's current passive figurehead role and his constitutional obligation to follow the Council's advice are the specific factors that the statement suggests people wish to change. Both conclusions describe the existing state implied by the text.

Q66 (D): The text focuses entirely on the risks of bacterial transfer via a "smoker's kiss" and the dangers to infants. It never mentions that symptoms related to passive smoking are currently on the decrease.

Q67 (A): The passage details a new blood test that identifies cancer signals years before symptoms appear. However, it does not contain the specific factual detail regarding a "10 mL" blood sample size .

Q68 (D): The passage details a new blood test that identifies cancer signals years before symptoms appear. However, it does not contain the specific factual detail regarding a "10 mL" blood sample siz

.**Q69 (C):** This is not in consonance because the passage mentions researchers considered factors like wind, waves, and storms, rather than "only the land area."

Q70 (C): According to the given information, the arrangement of five persons is: GM – AGM – DGM – GM – SM (from left to right), where DGM stands for Deputy General Manager. Hence, the position of DGM is third from the left.

Q71 (B): According to the given information, a direction graph can be drawn. The distance between the starting point A (House) and the destination point F is 4 m, computed as $AF = BC + CE = 3 + 1 = 4$ m.

Q72 (C): From the linear arrangement N – S – M – L – R, it is clear that M is occupying the middle position in the row. Hence, option (c) is correct.

Q73 (C): My sister's father's son-in-law's wife will be my sister. So, the lady in the photograph is the sister of Dev. Hence, option (c) is correct.

Q74 (A): According to the given information, a blood relation graph can be drawn. From the graph, it is clear that Tejveer is the grandfather of Isha.

Q75 (C): According to the given information, a blood relation graph can be drawn. From the graph, it is clear that Raja is the grandson of Ganga. Hence option (c) is correct.

Q76 (D): From the code language given: *mok dan sil* → nice big house; *fit kon dan* → house is good; *warm tir fit* → cost is high. Decoding: house → dan, is → fit, good → kon. So, 'kon' stands for 'good.'

Q77 (A): A clear objective is necessary because it provides the focus and commitment required for a student to succeed. Thus, the Reason correctly explains the Assertion.

Q78 (C): Both are true proverbs, but the concept of "failure as a pillar of success" does not logically explain why a lack of planning leads to failure. Hence option c is the answer.

Q79 (B): A definite timetable is the practical application of "planned preparation," which the Reason states is essential for doing well in an exam.

Q80 (A): While it is a scientific fact that atmospheric pressure decreases with altitude, this is due to air density and gravity, not because the air is "purer." The answer to question 80 is option (a) as indicated in the answer key.

Section C: Mathematical Skills

Q81 (C): The number of ways in which one or more balls can be put in the bucket are: 0 or 1 or 2 . . . or 10 white balls, and 0 or 1 or 2 . . . or 8 red balls, and 0 or 1 or 2 . . . or 6

green balls. Hence required number of ways $= 11 \times 9 \times 7 - 1 = 693 - 1 = 692$.

Q82 (A): Number of green dyes $= 5$, blue dyes $= 4$, red dyes $= 3$. Hence, required number of ways $= (2^5 - 1)(2^4 - 1)\,2^3 = 31 \times 15 \times 8 = 3720$.

Q83 (D): An elector can vote for at most 2 candidates as there are 2 vacancies. Hence required number of ways $= {}^{10}C_2 + {}^{10}C_1 = \dfrac{10 \times 9}{2} + 10 = 45 + 10 = 55$.

Q84 (A): Total number of bits of papers required $= 4! = 4 \times 3 \times 2 \times 1 = 24$.

Q85 (B): Number of words having at least one letter repeated = Total number of words − Total number of words in which no letter is repeated $= 10^5 - {}^{10}P_5$.

Q86 (B): Probability that part A is defective $= \dfrac{9}{100}$, so probability that A is not defective $= \dfrac{91}{100}$. Probability that part B is defective $= \dfrac{5}{100}$, so probability that B is not defective $= \dfrac{95}{100}$. Hence, required probability $= \dfrac{91}{100} \times \dfrac{95}{100} = 0.86$.

Q87 (A): Total number of ways of selecting a number $= 16 \times 16 = 256$. Total number of ways in which A and B can win $= 16$. Probability of winning the prize $= \dfrac{16}{256} = \dfrac{1}{16}$. Hence, probability that they will not win the prize in a single trial $= 1 - \dfrac{1}{16} = \dfrac{15}{16}$.

Q88 (A): Let E_1 = Both A and B speak truth, E_2 = Both A and B speak false, and E = A and B agree in a statement. Given $P(A) = \dfrac{75}{100} = \dfrac{3}{4}$ and $P(B) = \dfrac{80}{100} = \dfrac{4}{5}$. So $P(E_1) = \dfrac{3}{5}$, $P(E_2) = \dfrac{1}{20}$. Applying Bayes' theorem: $P\left(\dfrac{E_1}{E}\right) = \dfrac{12}{13}$.

Q89 (C): Let P and Q together take x hours to complete the work. Then time taken by P alone $= x + 8$ and by Q alone $= x + \dfrac{9}{2}$. Solving $\dfrac{1}{x+8} + \dfrac{2}{2x+9} = \dfrac{1}{x}$ gives $x^2 = 36$, so $x = 6$ hours.

Q90 (D): Let time taken by Sharavan to stitch the suit be x hours, so time taken by Sapan $= x - 3$. Solving $\dfrac{4}{x-3} + \dfrac{10}{x} = 1$ gives $x^2 - 17x + 30 = 0$, hence $x = \dfrac{17 + 13}{2} = 15$ h.

Q91 (B): Let A and B together complete the work in x days. Time for A alone $= x + 27$ days and for B alone $= x + 3$ days. Solving $\dfrac{1}{x+27} + \dfrac{1}{x+3} = \dfrac{1}{x}$ gives $x^2 = 81$, hence $x = 9$ days.

Q92 (A): Single discount allowed by A $= \left(30 + 16 - \dfrac{30 \times 16}{100}\right)\% = \left(46 - \dfrac{48}{10}\right)\% = 41.2\%$. Single discount allowed by B $= \left(20 + 26 - \dfrac{20 \times 26}{100}\right)\% = 40.8\%$. Hence, the discount given by A is more advantageous to the purchaser.

Q93 (A): Let cost price of the article be x and profit $= 17.5\%$. So SP $= \dfrac{117.5}{100}x$. Let new CP be x, so $x' = \dfrac{92}{100}x$ and new profit $= 30\%$. Solving $\dfrac{130}{100} \times \dfrac{92}{100}x - \dfrac{117.5x}{100} = 11.55$ gives $x = 550$.

Q94 (A): Here, Marked Price (MP) $= 65$ and SP $= 56.16$. First discount $= 10\%$, so SP after first discount $= \dfrac{90}{100} \times 65 = 58.5$. Second discount $= \dfrac{58.5 - 56.16}{58.5} \times 100\% = \dfrac{2.34}{58.5} \times 100\% = 4\%$.

Q95 (C): Discount $= 15\%$ and price after discount $= 25000$. So $25000 = \dfrac{85}{100} \times \text{MP}$, giving MP ≈ 29412. With profit $= 8\%$, required SP $= \dfrac{108}{100} \times 29412 \approx 31000$.

Q96 (B): Let the height of the first building be h m, so $DE = (150 - h)$ m. Given $\dfrac{DE}{EB} = \tan 30$, we get $\dfrac{150 - h}{60} = \dfrac{1}{\sqrt{3}}$, solving gives $h = 150 - \dfrac{60}{\sqrt{3}} = \left(150 - 20\sqrt{3}\right)$ m.

Q97 (A): Let the height of the kite be h m. Then $\sin 60 = \dfrac{h}{90}$, so $\dfrac{\sqrt{3}}{2} = \dfrac{h}{90}$, giving $h = 45\sqrt{3}$ m.

Q98 (C): Let the horizontal distance of the kite from the building be x m. Then $\tan 30 = \dfrac{32}{x}$, so $\dfrac{1}{\sqrt{3}} = \dfrac{32}{x}$, giving $x = 32\sqrt{3} \approx 55$ m.

Q99 (A): Using Heron's formula with $a = 13$, $b = 20$, $c = 21$: $s = \dfrac{13 + 20 + 21}{2} = 27$. Area $= \sqrt{27 \times 14 \times 7 \times 6} = 126\,\text{m}^2$. Area of both triangles $= 252\,\text{m}^2$, area of sides $= 990\,\text{m}^2$, area of rectangle $= 630\,\text{m}^2$. Total surface area of triangular prism $= 252 + 990 + 630 = 1872\,\text{m}^2$.

Q100 (C): Volume of cistern $= 2.4 \times 2 \times 1.5 = 7.2\,\text{m}^3$ and time $= 2\,\text{h}\,30\,\text{min} = 9000\,\text{s}$. Required rate $= \dfrac{7.2 \times 10^6}{9000} = 800\,\text{cm}^3/\text{s}$.

Q101 (B): Volume of water required to pass through pipe in 1 minute $= \dfrac{440}{10} = 44\,\text{m}^3$. Speed of water $= 7\,\text{m/min}$. Also $44 = \dfrac{22}{7} \times r^2 \times 7$, giving $r^2 = 2$, so $r = \sqrt{2}\,\text{m}$.

Q102 (A): Part of tank filled by A in 1 hour $= \dfrac{1}{20}$, by B in 1 hour $= \dfrac{1}{30}$. Combined rate $= \dfrac{1}{12}$. Part emptied by leak in 1 hour $= \dfrac{1}{48}$. Net rate with leak $= \dfrac{1}{16}$. Total time to fill the tank $= \dfrac{32}{3} + 4 = 14\dfrac{2}{3}\,\text{h}$.

Q103 (C): Let the three pipes be A, B, C taking a, b, c hours respectively. Given $b = a - 5$ and $b = c + 4$. Solving $\frac{1}{a} + \frac{1}{b} = \frac{1}{c}$ with substitution gives $b^2 - 8b - 20 = 0$, so $b = 10$ h. Hence, time required by first pipe $= b + 5 = 15$ h.

Q104 (A): Let filling capacity of pump be $x\,\text{m}^3/\text{min}$, emptying capacity $= (x{+}10)\,\text{m}^3/\text{min}$, total capacity $= 2400\,\text{m}^3$. Solving $\frac{2400}{x} - \frac{2400}{x+10} = 8$ gives $x^2 + 10x - 3000 = 0$, so $x = 50\,\text{m}^3/\text{min}$.

Q105 (B): Let the original speed of the train be x km/h. New speed $= \frac{7x}{11}$ km/h, new time $= 22$ h. Distance $= \frac{7x}{11} \times 22 = 14x$ km. Original time $= \frac{14x}{x} = 14$ h. Required time saved $= 22 - 14 = 8$ h.

Q106 (D): Let speed $= x$ km/h. Using $D = S \times T$: $(x - 4.5)\frac{84}{3600} = (x - 5.4)\frac{85}{3600}$. Solving gives $84x - 378 = 85x - 459$, so $x = 81$ km/h.

Q107 (A): Let the length of the shorter train be ℓ m, longer train $= 2\ell$. Solving $\frac{3\ell}{90 \times \frac{5}{18}} = 12$ gives $\ell = 100$ m, $2\ell = 200$ m. For platform length P: $\frac{200 + P}{48 \times \frac{5}{18}} = 45$, giving $P \approx 400$ m.

Q108 (A): Interest earned in 10 yr on 1000 at 5% per annum $= \frac{1000 \times 5 \times 10}{100} = 500$. Principal becomes 1500. To find time for 1500 to become 2000: $2000 = 1500 + \frac{1500 \times 5 \times t}{100}$, giving $t = \frac{500 \times 100}{7500} = 6\frac{2}{3}$ yr.

Q109 (A): Let the sum be x, y, z such that $\frac{1(5)x}{100} = \frac{2(5)y}{100} = \frac{3(5)z}{100} = k$. So $x = \frac{100k}{5}$, $y = \frac{100k}{10}$, $z = \frac{100k}{15}$. Given total $= 7700$, solving gives $k = 210$. Required difference $= x - z = \frac{100(210)}{5} - \frac{100(210)}{15} = 2800$.

Q110 (A): Principal for 1st year $= 4000$, rate $= \frac{15}{2}\%$. Interest for 1st year $= \frac{4000 \times 15}{2 \times 100} = 300$. Principal for 2nd year $= (4000 + 300) - 1500 = 2800$. Interest for 2nd year $= 210$. Principal for 3rd year $= 1510$. Interest for 3rd year $= 113.25$. Amount owed $= (1510 + 113.25) - 1500 = 123.25$.

Q111 (C): Given $A : B : C = 12 : 15 : 25$. Let $A = 12x$, $B = 15x$, $C = 25x$. Then $12x + 15x + 25x = 312 \Rightarrow 52x = 312 \Rightarrow x = 6$. So $A = 72$, $B = 90$, $C = 150$. Required ratio $= (B - A) : (C - B) = 18 : 60 = 3 : 10$.

Q112 (A): Milk in first container $= \frac{5}{6}$, in second $= \frac{7}{9}$. Ratio of milk in final mixture

$= \frac{80}{100} = \frac{4}{5}$. Using alligation: required ratio $= \frac{1/45}{1/30} = \frac{30}{45} = 2:3$.

Q113 (C): Average of first three friends = 15, so total = 45. Average of last three friends = 16, so total = 48. Total score of four friends = 45 + 19 = 64. Score of first friend = 64 − 48 = 16. Required percentage $= \frac{16}{48} \times 100\% = 33\frac{1}{3}\%$.

Q114 (B): Average score in 100 matches = 36, total = 3600. Correct score = 3600 − 40 + 90 = 3650. Percentage error $= \frac{3650 - 3600}{3650} \times 100\% = 1.36\%$.

Q115 (B): Let the number be x. Then $x = 17q_1 + 12$ and $x = 11q_2 + 8$. Solving: $17q_1 - 11q_2 = -4$ is satisfied when $q_2 = 5$, $q_1 = 3$. So $x = 17 \times 3 + 12 = 63$. When 63 is divided by 23, the remainder is **17**.

Q116 (D): Let angle $C = x$, so $\angle A = 2x$. Also $\angle B - \angle D = \frac{2x}{3}$. Since opposite angles of a cyclic quadrilateral are supplementary: $\angle A + \angle C = 180 \Rightarrow 3x = 180 \Rightarrow x = 60$, $\angle A = 120$. From $\angle B - \angle D = 40$ and $\angle B + \angle D = 180$: $\angle D = 70$, $\angle B = 110$. Maximum difference = 120 − 60 = 60.

Q117 (B): Length of circle with 4 balloons = 10 cm $\Rightarrow 2\pi r = 10$, so $r = \frac{5}{\pi}$. Radius of innermost circle = 5 cm. Number of balloons in circle of radius 5 cm = 4π. The sequence $4\pi, \frac{24\pi}{5}, \ldots, \frac{64\pi}{5}$ forms an AP with $n = 12$. Total number of balloons $= \frac{n}{2}[a + l] = 6\left[4\pi + \frac{64\pi}{5}\right] = 6 \times \frac{84\pi}{5} \approx 317$.

Q118 (D): Let number of CDs bought be x, CP = 1800, CP of each CD $= \frac{1800}{x}$. SP of $(x-1)$ CDs at profit of 6 each: Profit = 114 $\Rightarrow 6x^2 - 120x - 1800 = 0 \Rightarrow x^2 - 20x - 300 = 0$, so $x = 30$ CDs.

Q119 (D): Let side of first square = a m and second square = b m. Given $29a^2 = 6b^2 - 1$ and $9a = 4b + 1$. Solving gives $b = 11$ and $a = 5$. Difference in sides = $b - a = 11 - 5 = 6$ m.

Q120 (A): Let initial speed of car be x km/h, final speed = $(x + 10)$ km/h, distance = 75 km. Solving $\frac{75}{x} - \frac{75}{x+10} = \frac{1}{4}$ gives $x^2 + 10x - 3000 = 0$, so $x = 50$ km/h. Required time $= \frac{300}{50 + 10} = \frac{300}{60} = 5$ h.

Section D: Data Analysis and Sufficiency .

Q121 (A): Average readership per magazine in 2014 $= \frac{(3800 + 1700 + 2500 + 850) \times 100}{65} = \frac{885000}{65} \approx 13400$.

Q122 (A): Number of magazines in 2012 = 40 and in 2014 = 65. Number of magazines added = $65 - 40 = 25$.

Q123 (C): Number of added Hindi magazines between 2012 and 2013 = $26 - 18 = 8$. Number of added English magazines between 2012 and 2015 = $30 - 22 = 8$. Required ratio = $\frac{8}{8} = 1:1$.

Q124 (D): From the readership per magazine table for 2012 and 2013, it is clear that the readership per magazine declined for the 'Film' category (from 200 in 2012 to 191 in 2013).

Q125 (B): Readership of English sports magazines in 2012 = 400. Readership during 2012–15 = $400 + 600 + 1000 + 1200 = 3200$. Required ratio = $\frac{400}{3200} = \frac{1}{8}$.

Q126 (A): Total processing cost for water (industrial, energy, domestic) in 2012 = $25\times\frac{3}{10}+26\times\frac{5}{10}+30\times\frac{2}{10} = 7.5+13+7 = 27.5$. Total in 2014 = $49\times\frac{3}{10}+35\times\frac{5}{10}+30\times\frac{2}{10} = 14.7 + 17.5 + 6 = 38.2$. Required ratio = $\frac{27.5}{38.2} \approx 0.72$.

Q127 (D): Required percentage increase = $\frac{35-26}{26} \times 100\% = 34.6\%$.

Q128 (D): Required irrigation usage percentage = $\frac{490}{629} \times 100\% = 77.90\%$.

Q129 (D): Percentage of domestic usage in 2012 = $\frac{35}{531} \times 100\% = 6.59\%$. Percentage of domestic usage in 2015 = $\frac{30}{629} \times 100\% = 4.76\%$. Required difference = $6.59 - 4.76 = 1.82$.

Q130 (A): The industrial sector shows the highest percentage increase in usage from 2012 to 2015. Required percentage increase = $\frac{49-25}{25} \times 100\% = 96\%$.

Q131 (B): Column A: $(16, 4+8\times2-8) = 4+16-8 = 12$. Column B: $(3\times4+1, 5-3) = \left(12+\frac{1}{5}-3\right) = \frac{60+1-15}{5} = 9.2$. So the quantity in Column A is greater.

Q132 (B): Column A: $\frac{0.01}{0.1} = 0.1$. Column B: $0.01 \times 0.1 = 0.001$. So the quantity in Column A is greater.

Q133 (A): Column A: $\sqrt[9]{\frac{1}{3}} = \left(\frac{1}{3}\right)^{1/9}$. Column B: $\sqrt[18]{\frac{1}{2}} = \left(\frac{1}{2}\right)^{2/(9\times2)}$. Comparing gives Column B as greater; hence option (a) – Column B is greater.

Q134 (B): Column A: Semi-circumference of a circle with radius 10 cm $= \frac{2\pi r}{2} + 2r = \pi(10) + 20 = 10\pi + 20$. Column B: Circumference of a circle with radius 5 cm $= 2\pi(5) = 10\pi$. So the quantity in Column A is greater.

Q135 (B): Column A: Circumference of a circle with radius 1 cm $= 2\pi r = 2\pi \approx 6.28$ cm. Column B: Perimeter of a square with side 1.5 cm $= 4 \times 1.5 = 6$ cm. So the quantity in Column A is greater.

Q136 (D): The amount of private placement raised as a percentage of total funds was: 2010–11: 17.8%, 2011–12: 22.65%, 2013–14: 32.44%, 2014–15: 57.24%. So the amount was maximum in 2014–15.

Q137 (B): Total funds raised in 2011–12 = 51803 crore and in 2014–15 = 11271 crore. In 2010–11 = 42476 crore and in 2013–14 = 23337 crore. So the total amount of funds raised was least in 2014–15.

Q138 (D): The average amount raised by way of public issue for 2010–11 to 2014–15 excluding 2011–12 is: $\frac{20170 + 18375 + 13010 + 2575}{4} = \frac{54130}{4} =$ 13532 crore.

Q139 (A): Total amount raised by public issue $= 20170+26430+18375+13010+2575 = 80560$. Total amount raised $= 42476+51803+32597+23337+11271 = 161484$. Required percentage $= \frac{80560}{161484} \times 100\% = 49.9\%$.

Q140 (B): Required percentage decrease $= \frac{13658 - 7598}{13658} \times 100\% = \frac{6060}{13658} \times 100\% = 44.4\%$.

Q141 (A): Total production $= 40 + 30 + 50 + 40 + 60 = 220$. Average production of 2012–15 $= \frac{30 + 50 + 40 + 60}{4} = 45$. Required percentage $= \frac{45}{220} \times 100\% = 20\%$.

Q142 (C): Percentage change for the years: 2011–12: $\frac{5-3}{3} \times 100\% = 66.67\%$; 2012–13: $\frac{5.25 - 5}{5} \times 100\% = 5\%$; 2014–15: $\frac{6 - 3.75}{3.75} \times 100\% = 37.5\%$. 2016–15 showed 14.28%. Hence the answer is (c).

Q143 (B): Production in 2013 = 50000. Required percentage $= \frac{50000}{300000} \times 100\% = 16.7\%$.

Q144 (D): Production in 2011 = 30000. Cars sold $= \frac{30000 \times 80}{100} = 24000$. Revenue $= 24000 \times 500000 =$ 1200 crore.

Q145 (C): Total production in 2011 = 40000. Rejection $= \frac{40000 \times 10}{100} = 4000$. Sales

$= 40000 - 4000 = 36000$. Turnover $= 36000 \times 300000 =$ 1080 crore.

Q146 (D): Given 25% of South Asian children under 18 work as labourers = 125 million. So $100\% = \dfrac{125 \times 100}{25} = 500$ million children below age 18.

Q147 (D): The answer to question 147 is option (d) as indicated in the answer key.

Q148 (A): 50% of the world's illiterate live in South Asia, making it the region with the highest concentration of illiteracy globally.

Q149 (C): Ten out of 100 infants die at infancy and four more die before attaining the age of five years. Hence, 4% of infants born in South Asia do not survive beyond age 5.

Q150 (D): Required rate $= \dfrac{53 - 46}{46} \times 100\% = 15.2\%$.

Q151 (A): We have $x^2 - 4x + 3.75 = 0$. Solving gives $x = 2.5$ and $x = 1.5$. So only Statement II is sufficient to answer the question.

Q152 (C): From Statement I: $D > (A, C)$. From Statement II: $E > B > D$. Combining: $E > B > D > (A, C)$, so E got the maximum marks. Both statements are required.

Q153 (C): From Statement I: Let CP $= x$, then SP $= 1.25x$. From Statement II: Profit = 100 on every 5 books, so profit per book = 20. $20 = 1.25x - x = 0.25x \Rightarrow x = 80$. Both statements are required.

Q154 (D): The question cannot be answered by either of the statements alone or together. Insufficient data is provided to arrive at a definitive answer.

Q155 (B): Let wholesale price $= x$, so MP $= 1.2x$. If MP is sold at 10% discount: SP $= \dfrac{90}{100} \times 1.2x = 1.08x$. Profit = 10: $1.08x - x = 0.08x = 10$, so $x = \dfrac{10}{0.08} = 125$. Statement I alone is sufficient.

Q156 (B): Students passed in both subjects $= (90 + 50) - (150 - 30) = 140 - 120 = 20$.

Q157 (D): From Statement I: $a^2 - 4a + 4 = 0 \Rightarrow (a-2)^2 = 0 \Rightarrow a = 2$. From Statement II: $b^2 - 6b + 9 = 16 \Rightarrow b^2 - 6b - 7 = 0$, so $b = 7$ or $b = -1$. We cannot determine whether $a < b$ or $a > b$. Neither statement alone nor together is sufficient.

Q158 (C): From Statements I and II combined, the order is: Ramesh > Narender > Ram > Shyam > Naresh. So Ram is the third person in the queue. Both statements are required.

Q159 (C): From Statement I: $Y > Z$. From Statement II: $A > Y > X$. Combining: $A > Y > (X, Z)$. A got the maximum marks. Both statements are required.

Q160 (D): From Statement I: Two-digit numbers whose digits sum to 6 are 15, 51, 33, 42, 24. From Statement II: The difference of digits is 2, giving numbers 24 and 42. We cannot determine the required value uniquely. Neither statement alone nor together is sufficient.

Section E: Indian and Global Environment

Q161 (B): BIS is the world's oldest international financial organisation. Raghuram Rajan was the first Indian central banker to be appointed as vice-chairman of the BIS.
Q162 (C): The National League for Democracy (NLD) is a democratic socialist and liberal democratic political party in Myanmar. Nobel Laureate Aung San Suu Kyi is one of its founders. In the 2015 General Election, NLD won majority seats.

Q163 (C): 'Qute' is Bajaj's four-wheeled QE60. It is India's first quadricycle, designed for use as an affordable urban transport vehicle.

Q164 (C): The Competition Commission of India (CCI) is a quasi-judicial body established to eliminate practices that adversely affect competition in different industries and protect consumer interests while ensuring freedom of trade.

Q165 (A): Special Drawing Rights (SDR) is an international monetary reserve currency, created by the International Monetary Fund (IMF) in 1969.

Q166 (C): The answer to question 166 is option (c) as indicated in the answer key.

Q167 (D): Jonah Lomu was the youngest ever player to be described as the first true global superstar of rugby union, leaving a lasting legacy in the sport.

Q168 (B): Fauja Singh, the iconic 104-year-old marathon runner, also known as the 'Turbaned Tornado,' was chosen as the ambassador and symbol of Nestle India's 100-year running campaign.

Q169 (A): In India's first telecom spectrum trading transaction, Videocon Telecommunication, a subsidiary of Videocon Industries, sold its spectrum in Gujarat and UP (West) circle of Aditya Birla group's Idea Cellular at a valuation of 3310 crore.

Q170 (D): Taiwan's Wistron, the world's no. 2 contract manufacturer, formed a joint venture with Optiemus Infracom to make smartphones, tablets, and smart devices in India.

Q171 (C): Russian President Vladimir Putin lifted a ban on a Russian firm from working on Iranian enrichment sites in November 2015.

Q172 (A): As part of Indian Prime Minister Modi's visit to Singapore, the two countries signed a Cyber Security agreement to strengthen online security cooperation.

Q173 (C): For the first time in the history of cricket, a pink leather ball replaced the standard red ball during a day-night Test match.

Q174 (A): Li-Fi uses Visible Light Communication (VLC) to send data at extremely high speeds. Aside from its superior speed, it also offers a number of other benefits over Wi-Fi. As the signal is carried by optical light, it cannot travel through walls, thereby enhancing the security of local networks.

Q175 (C): South Korea is the first country outside the US to announce emissions scandal measures and punish Volkswagen, a German car manufacturer, on the basis of its own emission test.

Q176 (D): Antonio Costa became the new Prime Minister of Portugal after a coalition government of left parties gained majority in the national assembly.

Q177 (A): The World Bank announced in November 2015 that 'Skill India' would be funded 6600 crore, with activities ranging from strengthening skill training infrastructure in underserved areas to informing Indian workers about employment opportunities abroad and facilitating their movement to foreign shores.

Q178 (C): HSBC Bank announced the closure of its India private banking business. The decision was taken after a review of the bank's global private banking operations in India.

Q179 (B): Justice Tirath Singh Thakur became the 43rd Chief Justice of India in 2015, taking charge of the highest judicial office in the country.

Q180 (C): The meeting between National Security Advisors Ajit Doval and his Pakistani counterpart Nasir Khan took place in Bangkok in December 2015.

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Solutions

Q181 (A): Tata Group trusts will support US based not-for-profit Khan Academy to provide free online education to Indians through one of the biggest open-access online platforms.

Q182 (D): India beat Netherlands 3-2 in penalty shootout to take bronze medal in Hero Hockey World League match held in Raipur.

Q183 (B): Bharti Enterprises launch 'Nyaya-Bharti' initiative to provide legal and financial assistance including awareness to under privileged under trials.

Q184 (A): Sunlife's Insurance earlier stake in JV was 26%. It invested 1664 crore to increase its stake in Birla Sunlife Insurance from 26% to 49%.

Q185 (A): Mark Zuckerberg will put 99% of his Facebook inc share, currently worth $45 billion into a new philanthropy project, focusing on human potential and equality. He would sell or give upto $1 billion in shares in each of the next 3 years.

Q186 (B): Tata Sons, promoter of India's largest Industrial House Tata Group and Industrial and Commercial Bank of China (ICBC), the world's largest lender, has inked a deal where in the latter will be a strategic banking partner to the salt-to-software conglomerate.

Q187 (A): WHO unveiled Strawberry and Raspberry flavoured medicine customised for children to fight against pediatric Tuberculosis.

Q188 (D): Flipkart, India's largest e-commerce market place, has acquired a strategic minority stake in 'MapMyIndia', a leader in premium quality digital map data, GPS navigation tracking location based apps and GIS solution.

Q189 (A): India's best known Journalist, Barkha Dutt makes her debut as a writer with *The Unquiet Land: Stories from India's Fault Lines*.

Q190 (B): UN confers Shri Kiren Rijiju with Disaster Risk Reduction Asia Champion honour.

Q191 (C): Government of India opens AMRIT outlet at AIIMS for selling affordable drugs for Cancer and Heart diseases.

Q192 (A): International Children's Film Festival of India (ICFFI) is also popularly known as the Golden Elephant. It is a biennial festival in India.

Q193 (B): The 2nd High Global Level Conference on Traffic Safety, was hosted by the Government of Brazil and supported by WHO will be a milestone for road safety.

Q194 (A): Indian Railway issues the Letter of Award (LoA) for setting up Electric Locomotive Factory (ELF) at Madhepura in Bihar to a France based company, M/S Alstom Manufacturing India Limited.

Q195 (C): The answer is option (c).

Q196 (D): Sun Edition, a US renewable energy major, has won the 500 Megawatt Project. The company will put up the plant in an NTPC-developed Solen pank in Andhra Pradesh's Kurnool district.

Q197 (C): 2015 Davis Cup was 104th Edition of Davis Cup. It is a tournament between national team in men's tennis. Britain won their 10th title after defeating Belgium.

Q198 (D): As per the GFMS Gold Survey, India regained its top position from China as the biggest overall consumer of gold in the 1st 9-months of 2015 with a total consumption of 642 tonnes.

Q199 (A): The Hero World Challenge is a Golf Tournament hosted by Tiger Woods Foundation in December 2015. Title was won by Bubba Watson of USA.

Q200 (D): Sanjiv Goenka's New Rising bugged the new IPL franchise Chennai for Pune for the next two years.