RRB ALP CBT-II (Electronic Mechanic) Official Paper (Held On: 02 May, 2025 Shift 1) (Previous Year Paper)

RRB Assistant Loco Pilot (ALP) • 2025 • 175 questions • 150 minutes • Answer key

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1 question is in Hindi and not printed here. Each one links to the online version, where you can read it.

PART A

Q1. The resistivity of a conductor depends on which of the following factors?

(a) Area of the conductor
(b) Mass of the conductor
(c) Nature of the conductor
(d) Diameter of conductor

Q2. Which of the following statements is correct regarding negative work done?

(a) The work done cannot be negative.
(b) When the force is perpendicular to the displacement, the work done is negative.
(c) When the force acts opposite to the direction of displacement, the work done is negative.
(d) When the force and displacement are in the same direction, the work done is negative.

Q3. In areas with hot climate, white colour of the exterior walls of the house is preferred because

(a) White color keeps the interior environment of the house cool by reflecting sunlight.
(b) White color makes the wall more durable.
(c) White color makes the house brighter by absorbing more sunlight.
(d) The white color looks good.

Q4. The sum of Yash's and his father's ages is 90 years. When Yash's age equals his father's present age, he will be five times his son Suraj's present age. When Yash's age equals his father's present age, Suraj's age will be 12 years more than Yash's present age. Find Suraj's present age.

(a) 15 years
(b) 18 years
(c) 12 years
(d) 16 years

Q5. What should come in place of question mark (?) in the given alphanumeric series?

G5, I10, L15, N20, Q25, S30, ?

(a) W35
(b) V35
(c) V40
(d) U35

Q6. Which of the following is a supplementary protocol that allows non-ASCII data to be sent via e-mail?

(a) HTTPS
(b) Multipurpose Internet Mail Extensions (MIME)
(c) DNS
(d) Mailing Lists

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Q7. Which of the following options best describes the primary function of digital signatures in electronic communications?

(a) It automatically stores all electronic documents for future reference.
(b) It encrypts the entire message content to ensure confidentiality.
(c) It verifies the identity of the sender and ensures the integrity of the message.
(d) This allows the recipient to edit the document before adding the signature.

Q8. The areas of three adjacent faces of a solid cuboid are 216 cm^2, 114 cm^2 and 19 cm^2. Find the volume (in cm^3) of the cuboid.

(a) 684
(b) 955
(c) 532
(d) 880

Q9. Read the given statements and conclusions carefully. Assuming that the information given in the statements is true, even if it seems to be at variance from commonly known facts, decide which of the given conclusions logically follows from the statements.

Statements:

Some bananas are litchis.

All litchis are kiwis.

Some kiwis are strawberries.

Conclusions:

1. All bananas are kiwis is a possibility.
2. All kiwis are litchis.

(a) Only conclusion 1 follows
(b) Only conclusion 2 follows
(c) Neither conclusion 1 nor 2 follows
(d) Both conclusions 1 and 2 follow

Q10. Which of the following ecosystems has very low temperatures and frozen soil?

(a) Desert
(b) Tropical rainforest
(c) Pasture
(d) Tundra

Q11. If A is an acute angle and p tan A = n sec A, then find the value of $(p^2 - n^2)/pn$.

(a) cot A .cos A
(b) sin A .cos A
(c) (tan A)/(sec A)
(d) None of the above.

Q12. A fruit vendor initially had a few apples. He sold 40% of them and still had 300 apples left. How many apples did he initially have?

(a) 750
(b) 450
(c) 600
(d) 500

Q13. Megha bought a bag for Rs. 1,271 after getting an 18% discount on the marked price. Find the marked price of the bag.

(a) 1,450
(b) 1,650
(c) 1,550
(d) 1,350

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Q14. Which of the following methods is the safest method for disposal of toxic dust?

(a) Leaving it in the air for dilution.
(b) Sweeping it in open areas.
(c) Using special hazardous waste disposal containers.
(d) Putting it in regular trash cans.

Q15. Vijay cycles 10 meters from home to tuition, then 5 meters to the shop. He returns home in the same way, covering the same distance. Find the total length of the path.

(a) 20 m
(b) 15 m
(c) Zero
(d) 30 m

Q16. A, B, C, D, E, and F live on six different floors of the same building. The ground floor is numbered 1, the floor immediately above it is numbered 2, and so on, until the topmost floor is numbered 6. D lives on an odd-numbered floor, but not 3. The sum of the floors on which D and E live is 7. A lives on the floor immediately below C. F lives on the topmost floor. How many people live between E and F?

(a) 4
(b) 1
(c) 3
(d) 2

Q17. Which of the following noise levels is considered potentially harmful to human health when experienced over a long period of time?

(a) 70 dB
(b) 90 dB
(c) 30 dB
(d) 50 dB

Q18. 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 letter-cluster pair does not belong to that group? (Note: The odd letter-cluster pair is not based on the number of consonants/vowels or their position.)

(a) GN-PV
(b) JQ-SY
(c) HO-QW
(d) AH-JR

Q19. Which of the following relations is not correct?

(a) Electric power = $(\text{current})^2 \times \text{resistance}$
(b) Electric power = voltage × current
(c) Electric power = voltage/current
(d) Electric power = $(\text{voltage})^2$ / resistance

Q20. In the following triplet, each group of letters is related to the next group following a certain logic. Select the option from the given ones that follows the same logic.

TERM-ERTM-TMRE

(a) WHEN-HWEN-WENH
(b) ZERO-EZRO-ZREO
(c) VICE-ICVE-VECI
(d) USER-RESU-REUS

Q21. Which of the following options does not correctly represent the electric power P in a circuit (current, potential difference and resistance are symbolically written as I, V and R respectively.)

(a) $P = (V^2)/R$
(b) $P = I^2 R$

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(c) P = VI
(d) $P = IR^2$

Q22. In a certain code language, 'BARE' is coded as '8264' and 'RIDS' is coded as '3587'. What is the code for 'R' in the given code language?
(a) 3
(b) 8
(c) 6
(d) 5

Q23. Kinetic energy and potential energy together are called which form of energy?
(a) Mechanical
(b) Chemical
(c) Ionic
(d) Nuclear

Q24. If a circuit contains resistors of 10 Ω, 20 Ω and 60 Ω are connected in parallel, then find the total resistance of the circuit.
(a) 90 Ω.
(b) 60 Ω
(c) 6 Ω
(d) 20 Ω

Q25. What term is used to describe organisms in an ecosystem that produce their own food?
(a) Consumer
(b) Decomposer
(c) Vegetarian
(d) Producer

Q26. What should come in place of question mark (?) in the given series?
185 174 163 152 ? 130
(a) 144
(b) 142
(c) 143
(d) 141

Q27. What is the primary source of energy for most ecosystems?
(a) Soil
(b) Wind
(c) Sunlight
(d) Water

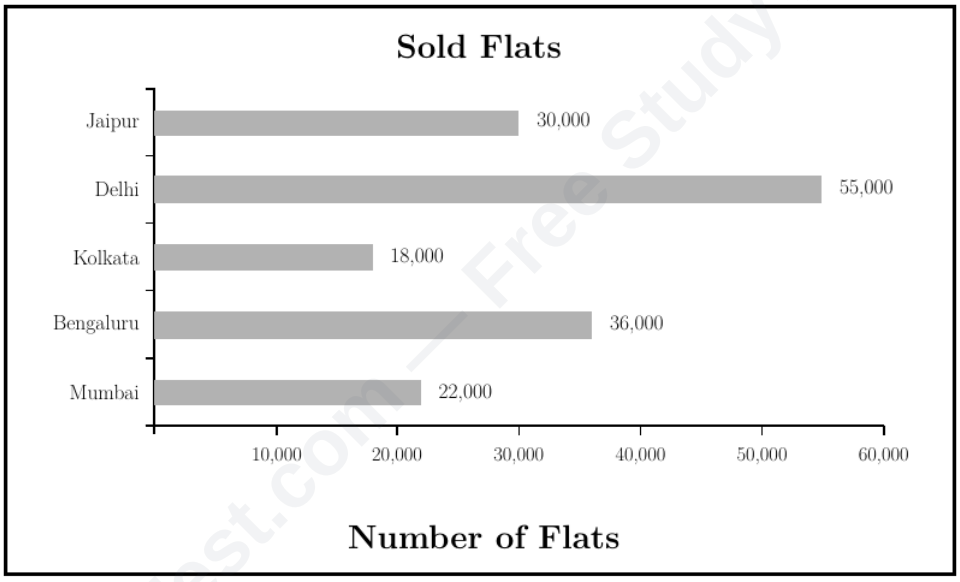
Q28. Potential energy falls under which of the following categories of energy?
(a) Thermal energy
(b) Light energy
(c) Chemical energy
(d) Mechanical energy

Q29. Two resistors of resistance 20 Ω and 30 Ω are connected in series in a circuit. If the supplied voltage is 250 V, find the current transmitted through the circuit.
(a) 8 A
(b) 12 A
(c) 5 A
(d) 20 A

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Q30. Study the given bar graph and answer the question below.

The given bar graph shows the number of flats sold by a builder in five different cities in the year 2020.



The number of flats sold in Delhi is what percent more than the number of flats sold in Mumbai?

(a) 75%
(b) 125%
(c) 120%
(d) 150%

Q31. Which of the following instruments is used to measure temperature?

(a) Hygrometer
(b) Voltmeter
(c) Thermometer
(d) Odometer

Q32. Use of energy efficient machinery in industrial settings mainly helps in _____.

(a) increase energy consumption and consequently the cost of the product
(b) reducing industrial energy requirements and improve the competitiveness of products
(c) reducing operational efficiency
(d) extending the life of old equipment

Q33. A dozen pairs of jeans costing Rs. 3,520 are available at a discount of 35%. How many pairs of jeans can be purchased for Rs. 572?

(a) 2
(b) 5
(c) 1
(d) 3

Q34. Refer to the following letter and symbol series and answer the question that follows. Counting is to be done from left to right only.

(Left) L R Ω Y A $ K ^ T J # Q & # E % S U * £ B (Right)

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

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

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Q35. In the SI system, which of the following options best describes the fundamental quantities?

(a) Distance, Speed, Acceleration
(b) Temperature, pressure, volume
(c) Force, power, energy
(d) Length, mass, time

Q36. An ammeter has 20 divisions between 0 and 2 A. The least count of an ammeter is _____.

(a) 0.2 A
(b) 0.1 A
(c) 1 A
(d) 2 A

Q37. If 'A' denotes '÷', 'B' denotes 'x', 'C' denotes '+' and 'D' denotes '-', then what will come in place of question mark (?) in the following equation?

38 C 32 A 4 D 5 B 7=?

(a) 10
(b) 8
(c) 11
(d) 9

Q38. If $x^3 + y^3 = 16$ and $x + y = 4$, then find the value of xy.

(a) 4
(b) 2
(c) 3
(d) 0

Q39. What is the average human body temperature?

(a) 40°C
(b) 32°C
(c) 42°C
(d) 37°C

Q40. Which of the following statements is true?

(a) In the kitchen, aluminium utensils are used because aluminium is a good conductor of heat.
(b) Both insulators and conductors allow heat to pass through them easily.
(c) Plastic is a good conductor of heat.
(d) Wood is a good conductor of heat.

Q41. Refer to the following letter and symbol series and answer the question that follows. Counting is to be done from left to right only.

(Left) ^ T J # * £ B L R Ω Y # E % S U $ K Q & (Right)

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

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

Q42. According to the SI system of units, how many fundamental units are used to measure physical quantities?

(a) 5
(b) 10
(c) 7
(d) 4

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Q43. Eight people are sitting in two parallel rows containing 4 people in each row, in such a way that there is an equal distance between adjacent persons. Row 1 contains A, B, C and D, all of whom are facing south. Row 2 contains P, Q, R and S, all of whom are facing north. Thus, each person faces another person in the other row. Only two people sit between P and Q. A faces the person sitting to the immediate left of P. R sits to the immediate left of S. D sits to the immediate right of C. Who among the following faces P?

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

Q44. Which of the following sequences of components primarily serves to execute instructions, store permanent firmware, temporarily store data during program execution, and provide a platform for interconnecting hardware components on a computer motherboard?

(a) RAM-ROM - CPU - PCB
(b) PCB-ROM-CPU-RAM
(c) CPU-RAM-ROM-PCB
(d) CPU-ROM-RAM- PCB

Q45. The area of a regular polygon with side 12 cm is 144 cm^2. If the perpendicular distance from the center to the side of the polygon is 6 cm, find the number of sides of the polygon.

(a) 5
(b) 7
(c) 6
(d) 4

Q46. A man purchased two varieties of pens at the rates of Rs. 8 for 9 pens and Rs. 8 per pen. If he purchased an equal number of pens of each of the two varieties and then sold all his pens at Rs. 6 per pen, what was his profit percentage?

(a) 33%
(b) 32%
(c) 45%
(d) 35%

Q47. Match the columns:

Engineering Applications	Types of Engineering Drawings
A) Plans, facade elevations, and foundation drawings of houses to be constructed.	P) Mechanical Engineering Drawings
B) Circuit Diagrams and Electrical Installation Drawings.	Q) Electronics Engineering Drawings
C) PCB Track Drawings.	R) Electrical Engineering Drawings
D) Riveted Joints and Welded Joints.	S) Civil Engineering Drawings

(a) A-P: B-R; C-Q; D-S
(b) A-S; B-P; C-Q; D-R
(c) A-S; B-R; C-Q; D-P
(d) A-S; B-R; C-P; D-Q

Q48. 6 men or 5 women can complete a task in 7 days. 6 men work for 5 days and then leave. Find the number of women needed to complete the remaining task in 5 days.

(a) 4
(b) 2
(c) 1
(d) 3

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Q49. Which of the following statements are correct regarding the use of a fire extinguisher?

Statement 1: It is safe to attempt to extinguish any type of fire, regardless of the presence of toxic fumes.

Statement 2: The P.A.S.S. technique, which stands for Pull, Aim, Squeeze, and Sweep, is recommended for effective use of a fire extinguisher.

(a) Neither statement 1 nor 2 is correct.
(b) Only statement 1 is correct.
(c) Both statements 1 and 2 are correct.
(d) Only statement 2 is correct.

Q50. Which of the following three-dimensional geometric figures has eight vertices and six rectangular faces?

(a) Pyramid
(b) Cylinder
(c) Parallelogram
(d) Cuboid

Q51. In a hospital, the ratio between the number of doctors and the number of nurses was 1 : 3. The addition of 12 new doctors and the departure of 24 nurses brings the ratio to 3 : 4. After k more nurses resign from the hospital, the ratio becomes 1 : 1. Find the value of k.

(a) 12
(b) 28
(c) 24
(d) 26

Q52. Which of the following statements is/are correct regarding functional dimension (F) in engineering drawings?

Statement 1: Functional dimensions are essential for the function of the component or space.

Statement 2: Functional dimensions are usually shown without any boundaries.

Statement 3: Functional dimensions are shown for reference purposes only.

(a) Only statement 1 is true
(b) Only statement 3 is true
(c) Only statements 2 and 3 are true
(d) Only statements 1 and 2 are true

Q53. 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 from commonly known facts, decide which of the given conclusions logically follows from the given statements.

Statements:

1. Some desks are tables.

II. All tables are cabinets.

III. All cabinets are beds.

Conclusions:

I. Some beds are tables.

II. All cabinets are desks.

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

Q54. Ganpat starts from point A and walks 18 m west. He turns left, walks 32 m, then turns left again, walks 26 m, then turns left again, walks 61 m, and stops at point B. Meena starts from point Z, which is 22 m east of point A. She walks 42 m north, turns right, walks 35 m, turns right and walks 13 m, and stops at point Y. Find the shortest distance between point B and point Y. (All turns are 90-degree turns only.)

(a) 52 m
(b) 43 m
(c) 57 m

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(d) 49 m

Q55. Three circular plates of radii 3 m, 2 m, and 1 m are cut from a rectangular cardboard sheet 46 m long and 8 m wide. If the area of the remaining cardboard sheet is equal to the area of a square, find the length of each side of the square. (Use π = 22/7)

(a) 20 m
(b) 18 m
(c) 14 m
(d) 16 m

Q56. In a certain code language, 'CARD' is coded as '8674' and 'MICE' is coded as '3517'. What is the code for 'C' in the given code language?

(a) 8
(b) 7
(c) 1
(d) 6

Q57. When an object of mass 50 kg is moved from one point to another along a horizontal line, what is the work done by the force of gravity on the object? (g = 10 m / s^2)

(a) Zero
(b) 50 J
(c) 500 J
(d) -500 J

Q58. If 50 : x :: x : 32 and x > 0, then find the value of x.

(a) 45.8
(b) 40
(c) 38.7
(d) 40.6

Q59. Two plumbers, X and Y, are paid a total of Rs. 770 per day by their employer. If X is paid 140% of the amount paid to Y, how much is Y paid per day (in Rs. , rounded to two decimal places)?

(a) 320.83
(b) 220.83
(c) 270.83
(d) 370.83

Q60. What will be the value of 10 km/hr in SI units?

(a) 10 m/s
(b) 0.16 m/s
(c) 2.7 m/s
(d) 1000 m/s

Q61. In a certain code language,

'A + B' means 'A is the mother of B',

'A - B' means 'A is the brother of B',

'A × B' means 'A is the wife of B' and

'A & B' means 'A is the father of B'.

If 'E & F + G - H x T', then how is E related to T?

(a) Wife's mother's father
(b) Wife's brother
(c) Wife's father
(d) Wife's mother's brother

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Q62. If x = (7 + √5), y = (7 - √5), then find the value of $x^2 + y^2$.

(a) 96
(b) 137
(c) 124
(d) 108

Q63. Convert 1 kilowatt hour (kWh) to joule.

(a) 1 kWh = 3.6 × 10^6 J
(b) 1 kWh = 3.6 × 10^7 J
(c) 1 kWh = 3.6 × 10^5 J
(d) 1 kWh = 3.6 × 10^3 J

Q64. Which of the following letter-clusters should replace # and % so that the pattern and relationship followed between the letter-cluster pairs 4 to the left of :: is the same as the pattern and relationship followed between the letter-cluster pairs 4 to the right of ::?

: HDI :: MIN : %

(a) = JFI, % = KGL
(b) # = JFK, % = KGM
(c) # = JFK, % = KGL
(d) = JFK, % = KHL

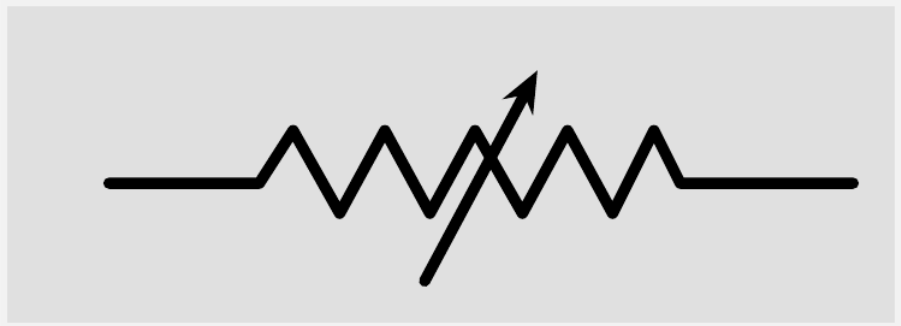
Q65. What is the designation of the trimmed sheet with dimensions 297 mm x 420 mm, as per the ISO-A size series?

(a) A1
(b) A2
(c) A4
(d) A3

Q66. Which of the following expressions is not correct for electric power?

(a) P = VI
(b) P= V^2/R
(c) P = I^2/R
(d) P = I^2R

Q67. What does the symbol given below in the circuit diagram represent?



(a) Voltmeter
(b) Voltage source
(c) Resistor
(d) Variable resistor

Q68. Preeti, Kiran, Grace, Ankit, Deepak, Nitin and Neelam each have an exam on a different day of the same week, starting from Monday and ending on Sunday. Preeti has an exam on Thursday. Only one person has an exam between Preeti and Nitin. Grace has an exam the day immediately before Nitin but not on Monday. Only two people have an exam between Grace and Deepak. Neelam has her exam before Ankit but after Kiran. Who among the following has an exam on Monday?

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(a) Nitin
(b) Neelam
(c) Kiran
(d) Deepak

Q69. If 5/9 of a number is 6 more than 1/2 of that number, then find that number.
(a) 104
(b) 108
(c) 106
(d) 102

Q70. What should be done immediately after a fuel spillage in a workshop?
(a) Cover it with plastic to prevent evaporation.
(b) Use water to wash it off
(c) Leave it as is and inform the supervisor later
(d) Empty the area and control overflow using absorbent materials

Q71. A cube of mass 5.74 g occupies a volume of 1.2 cm^3. The density (in g/cm^3) expressed with the correct number of significant figures is _____.
(a) 4.7833
(b) 4.8
(c) 4.78
(d) 4.783

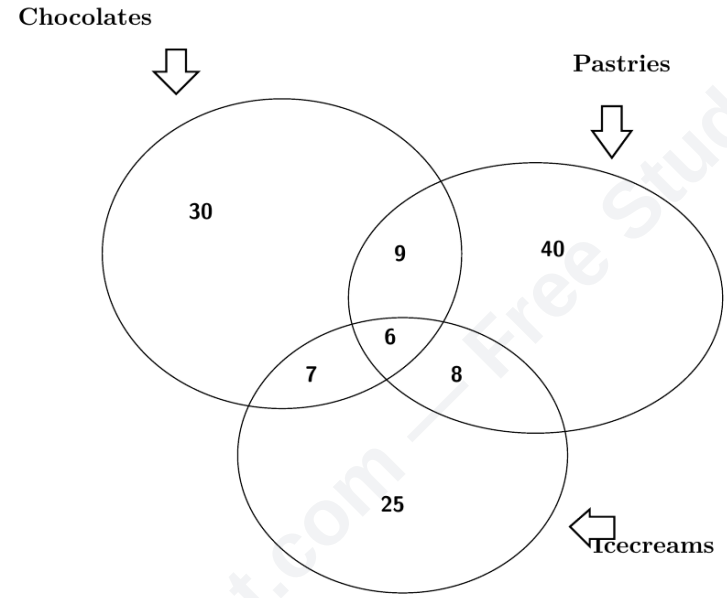
Q72. In science, work done is defined as:
(a) force / distance
(b) force / displacement
(c) force × displacement
(d) force × distance

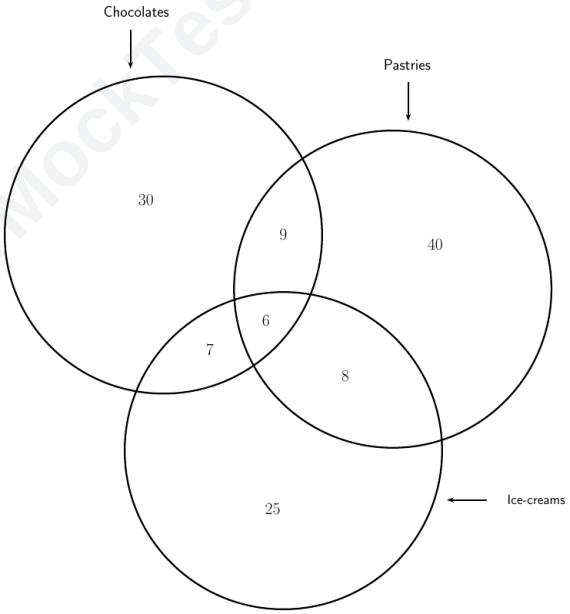
Q73. Simplify 976 × 265 + 976 × 735.
(a) 752800
(b) 976000
(c) 658200
(d) 876000

Q74. Which of the following is not an advantage of using mobile governance using ICT?
(a) Reduced costs for the government
(b) Better access to government services for citizens
(c) Increased transparency and accountability in government
(d) Increasing the efficiency of government processes

Q75. Study the given diagram carefully and answer the question given below. The numbers in different sections represent the number of children who like different desserts.

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How many children like both pastries and ice cream but not chocolate?

(a) 9
(b) 6
(c) 7
(d) 8

Q76. The rate of doing work is known as _____.

(a) Power
(b) Force
(c) Kinetic energy
(d) Potential energy

Q77. Which of the following actions help prevent injuries from slips and falls?

(a) Wearing loose shoes for comfort
(b) Walk carefully on wet floors
(c) Cleaning up spills immediately and using warning signs
(d) Ignoring clutter on the sidewalk

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Q78. In the following series, only one letter-cluster is wrong. Choose the wrong letter-cluster.

PCO MEM JGK GIJ DKG AME

(a) AME
(b) JGK
(c) DKG
(d) GIJ

Q79. Which of the following statements about geometric shapes is/are true?

1. Geometric shapes are enclosed figures formed by joining two or more points, lines, or curves.
2. Geometric shapes are always open-ended and made up of only straight lines.

(a) Only statement 1 is true
(b) Only statement 2 is true
(c) Both statements 1 and 2 are true
(d) Neither statement 1 nor 2 is true

Q80. A tank has two inlets, I1 and I2. I1 alone can fill it in 8 hours, and I2 alone can fill it in 4 hours. If both inlets are open, how long will it take to fill the tank?

(a) 2 hours
(b) 22/3 hours
(c) 32/3 hours
(d) 42/3 hours

Q81. A 280 m long train travelling at a speed of 72 km/hr crosses a platform in 30 seconds. Find the length (in m) of the platform.

(a) 335
(b) 280
(c) 300
(d) 320

Q82. Amit's income in 2019 was Rs. 27,000. His income increases by 10% each year. What was his income (in Rs.) in 2021?

(a) 32,400
(b) 29,700
(c) 32,670
(d) 27,000

Q83. Which of the following is the best way to identify hazards at the workplace?

(a) Waiting for an event to occur
(b) Performing regular safety inspections
(c) Relying on employees to report accidents
(d) Ignoring small risks

Q84. Given below are two sets of numbers. In each set, performing certain mathematical operations on the first number gives the second number. Similarly, performing certain mathematical operations on the second number gives the third number, and so on. Which of the given options follows the same set of operations as the given sets?

(Note: Operations must be performed on whole numbers without breaking the numbers into their component digits. For example, take 13. Operations such as addition, subtraction, multiplication, etc. can be performed on 13. Breaking 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not permitted.)

3-9-12-24; 4-16-20-40

(a) 9-2-11-24
(b) 1-1-2-4
(c) 6-12-18-34
(d) 7-49-56-122

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Q85. Which of the following will verify the credentials and documents of applicants uploaded on the National Scholarship Portal?

(a) National Scholarship Portal
(b) The University/Institute in which the applicant is studying.
(c) Third Party
(d) Government

Q86. The average of three numbers is 20. If two numbers are 16 and 24, find the third number.

(a) 22
(b) 21
(c) 20
(d) 19

Q87. Which of the following statements is/are true?

Statement 1: Heat conductors allow heat to pass through them easily.

Statement 2: All plastics are good conductors of heat.

(a) Only statement 1
(b) Only statement 2
(c) Neither statement 1 nor statement 2
(d) Both statement 1 and statement 2

Q88. In the following number-pairs, the second number is obtained by performing certain mathematical operations on the first number. What number should be replaced by X and Y so that the pattern followed by the two numbers to the left of :: is the same as the pattern followed by the two numbers to the right of ::?

(Note: Operations must be performed on whole numbers, without breaking the numbers into their component digits. For example, take 13. Operations such as addition/subtraction/multiplication can be performed on 13. Breaking 13 into 1 and 3 and then performing mathematical operations on 1 and 3 is not permitted.)

X: 85 :: 36: Y

(a) x = 44, Y = 73
(b) x = 42, Y = 73
(c) x = 43, Y = 77
(d) x = 42, Y = 71

Q89. Jaspreet deposited Rs. 58,550 at 20% annual interest rate compounded annually. What is the total amount (in Rs.) Jaspreet will receive after 2 years ?

(a) 84,700
(b) 84,312
(c) 84,735
(d) 83,876

Q90. Rinku travels 136 meters in his car in 17 seconds. Find his speed (in km/hr).

(a) 11.6
(b) 17
(c) 28.8
(d) 26

Q91. What should come in place of question mark (?) in the given series?

893 891 889 887 ? 883

(a) 986
(b) 885
(c) 985
(d) 886

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Q92. Ten people are sitting in two parallel rows, five in each row, in such a way that there is an equal distance between adjacent persons.

Row I contains A, B, C, D, and E, all of whom are facing south. Row II contains R, S, T, U and V, all of whom are facing north. Thus, each person faces a person from the other row. A sits at the right end of his row and faces U. R sits in the middle of his row and faces C. E sits between C and D, facing T. S sits at the right end of his row.

Who sits exactly opposite B?

(a) T
(b) R
(c) U
(d) V

Q93. What type of thermometer is used to measure the internal temperature of ice?

(a) Digital thermometer
(b) Clinical thermometer
(c) Infrared thermometer
(d) Laboratory Thermometer

Q94. An ammeter with a range of 0 to 10 A reads a current of 7.5 A. If its actual value is 6.2 A, the relative error is _____.

(a) 13%
(b) 17.33%
(c) 20.96%
(d) 4.8%

Q95. The average of 5 results is 51 and the average of the first 4 of them is 50. The 5th result is.

(a) 55
(b) 50
(c) 51
(d) 54

Q96. A copper spoon is dipped in hot water. What happens to the other end?

(a) It gets heated by conduction.
(b) It cools down by conduction.
(c) It gets heated by convection.
(d) It cools down by convection.

Q97. Based on the English alphabetical order, three of the following four letter-clusters are alike in a certain way and thus form a group. Which of the given letter-clusters does not belong to that group? (Note: The odd letter-cluster is not based on the number of consonants/vowels or their position in the letter-cluster.)

(a) GMOT
(b) FLNS
(c) NTVB
(d) LRTY

Q98. A rod of length 8/9 meters breaks into two pieces. If one piece is 1/3 meters long, find the length (in m) of the other piece.

(a) 2/9
(b) 7/9
(c) 5/9
(d) 4/9

Q99. This question is in Hindi. Read it online.

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Q100. An object weighs 60 N on Earth. What will be its weight on the surface of the Moon?

(a) 600 N
(b) 10 N
(c) 6 N
(d) 60 N

PART B

Q101. Minimum gate required to implement XOR gate using NOR gate only are:

(a) 4
(b) 2
(c) 5
(d) 3

Q102. Why is it important for every person to follow safety procedures in the workplace?

(a) To reduce operational costs significantly
(b) To minimise risks and avoid accidents
(c) To limit the need for frequent supervision
(d) To increase overall production efficiency

Q103. What is the role of the LC oscillator in an inductive proximity switch?

(a) It detects light intensity.
(b) It measures temperature changes.
(c) It generates a high-frequency electromagnetic field.
(d) It converts AC voltage to DC voltage.

Q104. A circular hole of radius 3 cm is cut from a rectangular sheet of dimensions 12 cm × 10 cm. Find the remaining area.

(Take π = 3.14)

(a) 95.86 cm²
(b) 75.74 cm²
(c) 100 cm²
(d) 91.74 cm²

Q105. What is the Boolean expression for the carry-out (Cout) output of a Full Adder?

(a) Cout=(A·B)⊕Cin
(b) Cout=A⊕B⊕Cin
(c) Cout=(A·B)+(B·Cin)+(Cin·A)
(d) Cout=(A·B)·Cin

Q106. Which type of light source is commonly used in photoelectric switches?

(a) Fluorescent lamp
(b) Infrared LED
(c) Halogen lamp
(d) Incandescent bulb

Q107. Which of the following hand-operated drilling machines is used for drilling small diameter holes up to 6 mm?

(a) Ratchet drilling machine
(b) Bevel gear type drilling machine
(c) Electric hand drill
(d) Breast drilling machine

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Q108. While using a pulse code modulator circuit, the output of the quantizer is fed to the _____.

(a) mixer
(b) multiplexer
(c) encoder
(d) decoder

Q109. A/an _____ is connected in series with the voltmeter to increase the range of the voltmeter.

(a) inductor
(b) resistor
(c) capacitor
(d) inductor and capacitor in series

Q110. Which of the following is a switching error in electrical measuring instruments?

(a) Wrong connection of the meter
(b) Error due to wrong calculation of subdivisions
(c) Error due to heat
(d) Error due to vibration

Q111. What is the purpose of an emergency evacuation plan?

(a) To ensure safe and orderly evacuation during emergencies
(b) To allow workers to leave early
(c) To avoid safety drills
(d) To increase productivity

Q112. Which of the following Boolean expressions represents the behaviour of a 3-input OR gate?

(a) A * B * C
(b) (A * B) + C
(c) A + B + C
(d) (A + B) * C

Q113. For what purpose are pins and clips used in engineering drawings?

(a) To support the drawing paper/tracing paper for making drawings
(b) To fasten the drawing sheet on to the drawing board firmly so that it does not shake
(c) To transfer dimensions and dividing lines into a number of equal parts
(d) To draw horizontal lines, parallel lines and to guide/hold the set squares

Q114. What is the condition for a transistor to operate in the saturation region?

(a) The base-emitter junction is forward-biased and the collector-emitter junction is reverse-biased.
(b) The base-emitter junction is reverse-biased.
(c) The base-emitter junction is reverse-biased and the collector-emitter junction is forward-biased.
(d) The base-emitter junction is forward-biased and the collector-emitter junction is also forward-biased.

Q115. The 8051 microcontroller supports the bit-addressable memory feature that is located at the memory locations _____.

(a) RAM addresses 0x30 to 0x7F
(b) RAM addresses 0x20 to 0x2F
(c) RAM addresses 0x0 to 0x1F
(d) RAM addresses 0x80 to 0xFF

Q116. What is the primary reason for electrical injuries when a person comes in contact with electrical equipment?

(a) Devices are used for too long
(b) Electrical equipment is not properly grounded.
(c) Current flows through the body causing harm.
(d) Electrical devices are too powerful.

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Q117. A circuit consists of three resistors; 15 ohms, 10 ohms, and 20 ohms. The 15-ohm resistor is in series with the parallel combination of the 10-ohm and 20-ohm resistors. If a 24 V battery is applied across the circuit, what is the total current flowing through the circuit?

(a) 0.1 A
(b) 3.1 A
(c) 2.1 A
(d) 1.1 A

Q118. What is the primary advantage of the bit-addressable area in the 8051's internal RAM?

(a) It allows bit-level access to data memory, providing precise control for applications like I/O operations.
(b) It is used for storing large amounts of data in a compressed format
(c) It reduces the power consumption by allowing individual bits to be turned off.
(d) It increases the overall size of the internal RAM.

Q119. Gaskets, seals and spacers are made using:

(a) pin punch
(b) centre punch
(c) hollow punch
(d) prick punch

Q120. Which of the following types of pliers is used to shape loops in wires and to form curves in light metal strips?

(a) Flat nose pliers
(b) Round nose pliers
(c) Slip-joint pliers
(d) End cutting pliers

Q121. How are flip flops used in digital counters?

(a) Flip-flops convert analogue input signals to a digital count.
(b) Flip-flops store the count value in binary form and change state with each clock pulse.
(c) Flip-flops generate a clock signal for the counter.
(d) Flip-flops perform addition operations for the counter.

Q122. In a lead-acid battery, what is the chemical composition of the material used for the positive plate during discharge?

(a) Lead dioxide (PbO_2)
(b) Sulphuric acid (H_2SO_4)
(c) Lead sulfate ($PbSO_4$)
(d) Lead (Pb)

Q123. Why is a high-impedance input preferred in a frequency meter?

(a) To reduce display brightness fluctuations
(b) To increase the power consumption of the meter
(c) To prevent voltage drop across the circuit being measured
(d) To allow better voltage regulation

Q124. The unit for specific gravity is _____.

(a) kg/m^3
(b) g/cm^3
(c) m/s^2
(d) no unit (dimensionless)

Q125. Which type of circuit is used to amplify low-level signals, such as those from sensors or microphones, to a level that is sufficient to drive a load?

(a) Power amplifier
(b) Voltage amplifier
(c) Current amplifier

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(d) Operations-based Schmitt trigger

Q126. In an ideal op-amp, what would happen if there were no feedback in the circuit?

(a) The output would saturate to supply limits.
(b) The output would be unpredictable.
(c) The gain would become unity.
(d) The output would remain at zero.

Q127. What type of oscillator uses a capacitive voltage divider as the feedback network?

(a) Colpitts oscillator
(b) Hartley oscillator
(c) Crystal oscillator
(d) RC oscillator

Q128. Non-functional dimensions are _____.

(a) not essential for the function of the space or component
(b) derived from the values of the related features of a drawing
(c) directly derived from the values given on a drawing
(d) essential for the function of the space or component

Q129. When using a multimeter to measure current, which of the following is correct?

(a) The multimeter is connected only across resistive components.
(b) The multimeter is connected in parallel with the load.
(c) The multimeter is connected in series with the load.
(d) The multimeter is connected directly to the power source.

Q130. The loading effect of a voltmeter is determined by _____.

(a) the input resistance of the voltmeter
(b) the weight of the voltmeter
(c) the size of the voltmeter display
(d) the frequency of the circuit

Q131. How can the range of an ammeter be extended?

(a) By connecting a resistor in series with the ammeter
(b) By increasing the applied voltage
(c) By connecting a shunt resistor in parallel with the ammeter
(d) By using a step-up transformer

Q132. What is the role of a capacitor in an op-amp integrator circuit?

(a) It blocks AC signals and passes DC signals.
(b) It stores charge and accumulates voltage over time.
(c) It amplifies the input signal.
(d) It acts as a voltage divider.

Q133. If a 1 : 4 demux has an input of logic 1 and the select lines (S1, S0) are set to 01, what will be the output?

(a) Output 2 will be 1.
(b) Output 3 will be 1.
(c) Output 0 will be 1.
(d) Output 1 will be 1.

Q134. Which of the following files is used for filing narrow grooves and angles above 10°?

(a) Half round file
(b) Triangular file
(c) Square file
(d) Knife-edge file

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Q135. In the 8051, how does the interrupt enable (IE) SFR and the interrupt priority (IP) SFR work together to manage interrupt handling?

(a) IE enables or disables individual interrupts, while IP sets the priority level for each interrupt source
(b) IE sets the priority levels, while IP enables or disables individual interrupts.
(c) IE enables or disables individual interrupts, while IP sets the global interrupt enable
(d) IE sets the global interrupt enable, while IP sets the address of the interrupt service routine.

Q136. What is the advantage of using a transistor as a switch in a power electronic circuit?

(a) High current gain
(b) High voltage gain
(c) High power gain
(d) High switching frequency and low switching losses

Q137. What is the advantage of giving heat treatment to a material?

(a) To decrease the melting point of the material
(b) To increase the weight of the material
(c) To change it from one element to another element
(d) To make surgical knives of sharp edges

Q138. Which of the following configurations, commonly used in audio amplifiers, has a high current gain and a good voltage gain?

(a) Common Base (CB)
(b) Common Collector (CC)
(c) Common Emitter (CE)
(d) Common Drain (CD)

Q139. What happens when an object enters the sensing range of a capacitive proximity switch?

(a) The capacitance of the LC circuit changes.
(b) The resistance of the circuit increases.
(c) The circuit stops oscillating permanently.
(d) The inductance of the LC circuit changes.

Q140. What should be the current rating of an induction type watt meter, in general, if a current transformer is used for measurement of power?

(a) 2A
(b) 5A
(c) 10A
(d) 30A

Q141. A drawing instrument box is used to carry all _____ instruments.

(a) drilling
(b) drawing
(c) screening
(d) casting

Q142. Manganese is used as a shunt resistor for extension of range in an Ammeter because _____.

(a) manganese is a superior conductor
(b) there won't be any magnetic loss
(c) there won't be any variation in resistance due to temperature
(d) manganese is a highly resistive material

Q143. What is the significance of beta (β) in a transistor?

(a) Power gain in common emitter configuration
(b) Current gain in common base configuration
(c) Power gain in common base configuration

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(d) Current gain in common emitter configuration

Q144. Which of the following is NOT the correct truth table output for an OR gate?

(a) 1 if either input is 1
(b) 0 if both inputs are 0
(c) 1 if both inputs are 1
(d) 0 if either of input is 1

Q145. Select the correct statement regarding amplitude modulation.

(a) The modulation index of AM is directly proportional to peak amplitude of the analog modulating signal and the carrier signal.
(b) The modulation index of AM is inversely proportional to peak amplitude of the analog modulating signal and the carrier signal.
(c) The modulation index of AM is directly proportional to peak amplitude of the analog modulating signal and inversely proportional to the peak amplitude of the carrier signal.
(d) The modulation index of AM is directly proportional to peak amplitude of the carrier signal and inversely proportional to the peak amplitude of the analog modulating signal.

Q146. What is the sum output of a Full Adder when the inputs A = 1, B = 1, and Cin = 0?

(a) 2
(b) 3
(c) 1
(d) 0

Q147. A message signal made of multiple frequency components has a maximum frequency value of 4 KHz. Find the minimum sampling frequency required according to the sampling theorem.

(a) 8 KHz
(b) 2 KHz
(c) 4 KHz
(d) 6 KHz

Q148. What is a key advantage of using MOSFETs in electronic circuits compared to other types of transistors?

(a) High frequency response
(b) Ability to amplify both AC and DC signals
(c) Ability to handle higher voltages and currents than BJTs
(d) High input impedance and low power consumption

Q149. If the current flowing through a conductor is 5 A and the resistance of the conductor is 10 ohms, what will be the voltage across the conductor, according to Ohm's Law?

(a) 10 V
(b) 50 V
(c) 15 V
(d) 5 V

Q150. In a velocity-time graph, the negative slope represents _____.

(a) acceleration
(b) retardation
(c) displacement
(d) distance

Q151. Which type of transformer is used in a full wave rectifier circuit with two diodes?

(a) Auto-transformer
(b) Step-up transformer
(c) Center-tapped transformer
(d) Current transformer

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Q152. In the IC 555 block diagram, which type of flip-flop is used?

(a) RS flip-flop
(b) D flip-flop
(c) T flip-flop
(d) JK flip-flop

Q153. How many parallel I/O ports are available in the 8051 microcontrollers?

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

Q154. What should you do to ensure your personal safety at work?

(a) Take risks to finish tasks quickly.
(b) Work in a hurry without checking equipment.
(c) Ignore warning signs and instructions.
(d) Wear personal protective equipment.

Q155. Which of the following is an important safety measure during a power failure?

(a) Using candles for lighting
(b) Ignoring alarm systems
(c) Continuing to use equipment without verifying power status
(d) Ensuring all machines and electrical equipment are turned off

Q156. What is the output waveform of a half-wave rectifier considering input as a sinusoidal AC signal?

(a) Perfect sine wave
(b) Triangular wave
(c) Square wave
(d) Pulsating DC wave

Q157. Which of the following organisations is responsible for enforcing workplace safety regulations in India?

(a) Environmental Protection Agency (EPA)
(b) World Health Organization (WHO)
(c) Food and Drug Administration (FDA)
(d) Directorate General of Factory Advice Service and Labour Institutes (DGFASLI)

Q158. The purpose of copper shading rings in an induction type single phase energy meter is:

(a) to produce eddy current damping
(b) to produce phase difference between flux and voltage in a pressure coil
(c) to produce magnetic force
(d) to produce controlling force

Q159. if $\sin\theta = 3/5$, find $\cos\theta$.

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

Q160. Which of the following vices consists of a handle and a small collet chuck at one end?

(a) Hand vice
(b) Pin vice
(c) Toolmaker’s vice
(d) Pipe vice

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Q161. When selecting a sheet size for an original drawing, what should be the primary consideration?

(a) The clarity and resolution required.
(b) The standard size of the drawing office.
(c) The size of the reproduction.
(d) The orientation of the drawing (horizontal or vertical).

Q162. What is the primary action that occurs in the base region of an NPN transistor when a small positive voltage is applied to the base with respect to the emitter?

(a) The base-emitter junction is reverse-biased.
(b) Electrons from the emitter are attracted to the base region.
(c) Holes are created in the base region.
(d) The collector current is reduced.

Q163. Arrange the following steps in the correct order to draw an equilateral triangle with each side of 35 mm.

1. Join CA and CB.
2. Draw a line and mark AB 35 mm as the side of the triangle.
3. With radius AB and center A and B, draw arcs cutting at C.
4. ABC is the required triangle.

(a) 2, 3, 1, 4
(b) 1, 2, 4, 3
(c) 2, 1, 3, 4
(d) 3, 2, 1, 4

Q164. What is the typical sensitivity of commercially available LVDTs?

(a) 0.1 to 0.5 mV/mm
(b) 0.5 to 5 mV/mm
(c) 5 to 10 mV/mm
(d) 50 to 300 mV/mm

Q165. In a non-inverting amplifier, what is the ideal input impedance?

(a) Infinite
(b) Equal to Rin (Input Resistor)
(c) Zero
(d) Equal to Rf (Feedback Resistor)

Q166. What is the effect of a decrease in base area region due to a rise in base width modulation on the collector current in a PNP transistor?

(a) The collector current increases.
(b) The collector current remains the same.
(c) The collector current becomes zero.
(d) The collector current decreases.

Q167. What is the sum of (3/8) + (5/12)?

(a) 8/20
(b) 7/12
(c) 19/24
(d) 17/24

Q168. The pointer of the dynamo meter type power factor meter moved to the left of the centre. Which of the following does it indicate?

(a) Capacitive load and power factor leading
(b) Inductive load and power factor lagging
(c) Capacitive load and power factor lagging
(d) Inductive load and power factor leading

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Q169. To implement an OR gate using only NAND gates, how many NAND gates are required?

(a) 1
(b) 2
(c) 3
(d) 4

Q170. How many minimum number of NAND gates will be required to implement the Boolean expression F = AcdotB + C using only NAND gate?

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

Q171. How can one avoid a parallax error while taking a reading from a moving iron type voltmeter?

(a) By seeing straight on the needle
(b) By seeing the needle at an angle of 90°
(c) By seeing the needle at an angle of 45°
(d) By seeing the image of the pointer on the mirror

Q172. According to BIS SP 46-2003, which of the following applications is correctly represented by a chain-thin line in engineering drawings?

(a) Center lines
(b) Hidden edges
(c) Dimension lines
(d) Visible edges

Q173. When measuring the resistance of a resistor using an ohmmeter, what does a reading of zero resistance indicate?

(a) The resistor is functioning normally.
(b) The resistor is open-circuited.
(c) The ohmmeter is malfunctioning.
(d) The resistor is short-circuited.

Q174. Which of the following parts of a file is the part fitted to the tang for holding the file?

(a) Tang
(b) Edge
(c) Handle
(d) Tip or Point

Q175. In a JK Flip-Flop, if J = 0, K = 0 and the clock pulse occurs, what will happen to the output Q?

(a) The output will remain unchanged.
(b) The output will be reset to 0.
(c) The output will be set to 1.
(d) The output will toggle.

ANSWER KEY

1	a	2	a	3	a	4	a	5	a	6	a	7	a	8	a	9	a	10	a
11	a	12	a	13	a	14	a	15	a	16	a	17	a	18	a	19	a	20	a
21	a	22	a	23	a	24	a	25	a	26	a	27	a	28	a	29	a	30	a
31	a	32	a	33	a	34	a	35	a	36	a	37	a	38	a	39	a	40	a
41	a	42	a	43	a	44	a	45	a	46	a	47	a	48	a	49	a	50	a
51	a	52	a	53	a	54	a	55	a	56	a	57	a	58	a	59	a	60	a
61	a	62	a	63	a	64	a	65	a	66	a	67	a	68	a	69	a	70	a

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71	a	72	a	73	a	74	a	75	a	76	a	77	a	78	a	79	a	80	a
81	a	82	a	83	a	84	a	85	a	86	a	87	a	88	a	89	a	90	a
91	a	92	a	93	a	94	a	95	a	96	a	97	a	98	a	99	a	100	a
101	a	102	a	103	a	104	a	105	a	106	a	107	a	108	a	109	a	110	a
111	a	112	a	113	a	114	a	115	a	116	a	117	a	118	a	119	a	120	a
121	a	122	a	123	a	124	a	125	a	126	a	127	a	128	a	129	a	130	a
131	a	132	a	133	a	134	a	135	a	136	a	137	a	138	a	139	a	140	a
141	a	142	a	143	a	144	a	145	a	146	a	147	a	148	a	149	a	150	a
151	a	152	a	153	a	154	a	155	a	156	a	157	a	158	a	159	a	160	a
161	a	162	a	163	a	164	a	165	a	166	a	167	a	168	a	169	a	170	a
171	a	172	a	173	a	174	a	175	a										

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