



रेल भर्ती बोर्ड / RAILWAY RECRUITMENT BOARDS
सी ई एन - ०१/२०२५ - CEN - 01/2025
सहायक लोको पायलट की भर्ती/ Recruitment of Assistant Loco Pilot



Test Date	28/07/2026
Test Time	9:30 AM - 12:00 PM
Subject	ALP Stage 2 Electronics Mechanic

* Note
Correct Answer will carry 1 mark per Question.
Incorrect Answer will carry 1/3 Negative mark per Question.

1. Options shown in green color with a tick icon are correct.
2. Chosen option on the right of the question indicates the option selected by the candidate.

Section : PART-A

- Q.1 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:

Some glasses are spoons.
All spoons are forks.

Conclusions:

- (I) Some glasses are forks.
(II) All forks are spoons.

- Ans ☒ A. Both conclusions (I) and (II) follow
☒ B. Only conclusion (II) follows
☒ C. Only conclusion (I) follows
☒ D. Neither conclusion (I) nor (II) follows

- Q.2 In this question, a group of numbers/symbols is coded using letter codes as per the codes given below and the conditions which follow. The correct combination of codes following the conditions is your answer. If none of the conditions follow, then the codes for the respective number/symbol are to be followed directly as given in the table.

Number/symbol	6	1	&	3	%	8	+	4	#	7	@	5	2	\$
Code	R	V	G	D	S	C	T	L	F	W	H	U	Y	N

Conditions:

- (i) If the first element is a symbol and the last element is an odd number, the codes for these two (the first and the last elements) are to be interchanged.
(ii) If the first element is an odd number and the last an even number, the first and last elements are to be coded as ©.
(iii) If both the second and third elements are perfect squares, the third element is to be coded as the code for the second element.

What will be the code for the following group?
+ 6 \$ 2 7

- Ans ☒ A. WSNYT
☒ B. TSNWW
☒ C. WRNYT
☒ D. STMWV



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Q.3	Which of the following statements correctly describes average velocity and its SI unit?
Ans	✗ A. Average velocity is the total distance divided by total time, and its unit is kilometer per hour. ✗ B. Average velocity is the total distance divided by total time, and its unit is meter per second. ✓ C. Average velocity is the total displacement divided by total time, and its unit is meter per second. ✗ D. Average velocity is the total displacement divided by total time, and its unit is kilometer per hour.
Q.4	A boat sails 40 km downstream and then 40 km upstream in a river. The boat's speed in still water is 12 km/hr and the speed of the stream is 4 km/hr. How much time does the boat take to cover the entire distance (both upstream and downstream)?
Ans	✗ A. 8 hours ✓ B. 7.5 hours ✗ C. 6 hours ✗ D. 10 hours
Q.5	Three pipes A, B and C can fill a tank in 12 hours, 18 hours and 24 hours, respectively. A leak at the bottom can empty the full tank in 36 hours. If all the pipes are opened together, in how many hours will the tank be filled? (Round off your answer to two decimal places.)
Ans	✗ A. 9.45 hours ✗ B. 5.56 hours ✗ C. 3.33 hours ✓ D. 6.55 hours
Q.6	What is the primary function of a fire hydrant in a workplace safety system?
Ans	✗ A. Detecting smoke and warning employees ✗ B. Removing hazardous fumes from the area ✗ C. Activating fire alarms automatically in emergencies ✓ D. Supplying large quantities of water to fight fires
Q.7	A diamond ring costs ₹85,000. Its price is reduced first by 11% and then by 4% on the reduced price. Find the final price of the ring after both discounts.
Ans	✗ A. ₹72,604 ✓ B. ₹72,624 ✗ C. ₹74,624 ✗ D. ₹73,624
Q.8	When a moving car suddenly applies brakes, its kinetic energy is transformed mainly into which form of energy?
Ans	✓ A. Heat energy ✗ B. Sound energy ✗ C. Potential energy ✗ D. Light energy
Q.9	Simplify: $60 - \{(-8) \times (-16 - 19 - 2)\} \div [5 \times \{2 + (-1) \times (-1)\}]$
Ans	✓ A. $\frac{604}{15}$ ✗ B. $\frac{594}{15}$ ✗ C. $\frac{614}{15}$ ✗ D. $\frac{608}{15}$

Q.10	Which statement best describes a 'point' in engineering drawing?
Ans	☒ A. A point indicates a precise location but has no size, length, or width. ☐ B. A point is the intersection of two lines and always has measurable length. ☐ C. A point is a short line segment used to mark measurements. ☐ D. A point represents a small area with both length and width.
Q.11	What is an email used for?
Ans	☐ A. File storage ☐ B. Creating documents ☒ C. Sending messages ☐ D. Data processing
Q.12	A, B, C, D, X, Y and Z are sitting around a circular table facing the centre of the table. Only two people sit between X and Z when counted from the right of X. Only two people sit between Z and D. Only three people sit between X and B. A sits to the immediate left of C. Who sits third to the left of Y?
Ans	☐ A. Z ☐ B. X ☒ C. C ☐ D. A
Q.13	An engineer is tasked with creating a hollow cone for a machine part, where the wall thickness must be consistent and the slant height is critical for assembly. Which factor is most important to ensure the cone will fit correctly in the final design?
Ans	☒ A. Ensuring the slant height matches the assembly requirement ☐ B. Prioritizing uniform wall thickness over all other features ☐ C. Matching only the overall height of the cone ☐ D. Focusing only on base diameter for precise fit
Q.14	The average of 8 numbers is 45. If one number, 59, is removed, what will the new average be?
Ans	☐ A. 42 ☒ B. 43 ☐ C. 41.5 ☐ D. 42.5
Q.15	In third angle projection, where is the object placed relative to the plane of projection?
Ans	☒ A. The object is placed in the third quadrant ☐ B. The object is placed in the first quadrant ☐ C. The object is placed in the second quadrant ☐ D. The object is placed in the fourth quadrant
Q.16	A train X crosses a man who is sitting in another train Y, which is moving in the opposite direction, in 8 seconds. However, when both trains are moving in the same direction, train X takes 20 seconds to pass the same man. If the length of train X is 360 meters and the length of train Y (in which the man is sitting) is 240 meters, what is the speed of train Y?
Ans	☐ A. 45.8 km/h ☐ B. 46.5 km/h ☐ C. 45.3 km/h ☒ D. 48.6 km/h

Q.17	An engineering student is tasked with creating a detailed side view of a complex machine part for an assembly drawing. Which approach will most accurately represent all features visible from the side while avoiding hidden overlaps or misinterpretations?
Ans	A. Sketch the side view freely without using projections from the main view B. Use only hidden lines for representing features on the far side in the view C. Project all visible elements from the side and omit hidden features unless needed D. Include all features even those not visible from the selected side view
Q.18	What should come in place of the question mark (?) in the given series? 74, 83, 101, 128, ?, 209
Ans	A. 164 B. 176 C. 146 D. 155
Q.19	E, F, G, H, L and M live on six different floors of the same building. The lowermost floor in the building is numbered 1, the floor above it, number 2 and so on, till the topmost floor is numbered 6. Only three people live above G. Only two people live between L and E. Only two people live between M and G. E lives below G but above F. How many people live below H?
Ans	A. Three B. Four C. One D. Two
Q.20	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? 14 A 30 B 45 C 15 D 9 = ?
Ans	A. 29 B. 27 C. 25 D. 28
Q.21	A cyclist covers 120 meters in 16 seconds on a straight road, then immediately covers 180 meters in 24 seconds on a similar road segment. What is the average speed of the cyclist during the entire journey?
Ans	A. 8.0 meters per second B. 7.0 meters per second C. 6.5 meters per second D. 7.5 meters per second
Q.22	An object has a mass of 10 kilograms. How does its weight on the Moon compare to its weight on Earth?
Ans	A. The object weighs zero on the Moon B. The object weighs the same on both the Moon and Earth C. The object weighs more on the Moon than on Earth D. The object weighs less on the Moon than on Earth
Q.23	What is the main purpose of ambient air quality standards?
Ans	A. To ensure air is routinely sampled to map historical pollution trends. B. To focus exclusively on industrial operations while ignoring other sectors. C. To require all industries to reduce emissions by the exact same percentage. D. To set legally permissible limits for specific pollutants to protect public health.

Q.24	Which approach most effectively reduces both nitrogen and phosphorus concentrations during wastewater treatment?
Ans	☒ A. Biological and chemical nutrient removal ☐ B. UV disinfection following secondary treatment ☐ C. Surface-flow constructed wetlands ☐ D. Primary sedimentation with extended aeration
Q.25	Which property of a fuse wire ensures it melts quickly when excess current flows?
Ans	☐ A. High electrical resistance ☐ B. Thick wire ☐ C. High melting point ☒ D. Low melting point
Q.26	When using a hand file during fitting operations, which action demonstrates adherence to tool safety protocols?
Ans	☒ A. Fitting a proper handle securely to the tang ☐ B. Filing above shoulder height for better leverage ☐ C. Holding the file near its tang during filing work ☐ D. Applying excessive downward force when filing
Q.27	O, P, Q, U and V have different heights. Only three people have heights between V and Q. P is taller than U but shorter than O. V is taller than Q. How many people are shorter than P?
Ans	☐ A. Three ☒ B. Two ☐ C. Four ☐ D. One
Q.28	A car travels on a highway, and its odometer records a reading of 180 km at 8:00 am and 240 km at 9:30 am. Based on this information, which statement best describes the car's average speed during this interval?
Ans	☒ A. The car's average speed is 40 km per hour as calculated from the odometer readings and time interval. ☐ B. The car's average speed is 240 km per hour since that was the odometer reading at 9:30 am. ☐ C. The car's average speed is 180 km per hour since that was the odometer reading at 8:00 am. ☐ D. The car's average speed is 60 km per hour based only on the change in odometer readings.
Q.29	Solve the system of equations: $-3x + 2y - z = -1, 6x - 6y + 7z = -7, 3x - 4y + 4z = -6$
Ans	☐ A. $x = -2, y = 2, z = 11$ ☐ B. $x = 1, y = 2, z = 2$ ☒ C. $x = 2, y = 2, z = -1$ ☐ D. $x = 2, y = 1, z = -3$

Q.30 Below are given two sets of numbers. In each set of numbers, certain mathematical operation(s) on the first number result(s) in the second number. Similarly, certain mathematical operation(s) on the second number result(s) in the third number and so on. Which of the given options follows the same set of operations as in the given 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.)

10 - 100 - 50 - 25; 2 - 4 - 2 - 1

- Ans
- ☒ A. 12 - 144 - 62 - 31
 - ☒ B. 5 - 25 - 15 - 7
 - ☒ C. 4 - 16 - 8 - 4
 - ☒ D. 8 - 64 - 32 - 14

Q.31 P, Q, R, S and T have different ages. T is elder than only one person. S is elder than P but younger than Q. R is elder than Q. Who is the youngest?

- Ans
- ☒ A. R
 - ☒ B. P
 - ☒ C. Q
 - ☒ D. S

Q.32 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 girls are hens. No hen is a cat.
Conclusion (I): No girl is a cat.
Conclusion (II): Some cats are hens.

- Ans
- ☒ A. Only conclusion (I) follows
 - ☒ B. Both conclusions (I) and (II) follow
 - ☒ C. Only conclusion (II) follows
 - ☒ D. Neither conclusion (I) nor (II) follows

Q.33 If $\left(x + \frac{1}{x}\right) = 3$, find the value of $\left(x^3 + \frac{1}{x^3}\right)$.

- Ans
- ☒ A. 18
 - ☒ B. 16
 - ☒ C. 15
 - ☒ D. 20

Q.34 A mechanical engineer must design a flange joint where two pipes are to be connected at a 45-degree angle. Which method should the engineer use to accurately represent the intersection line on a technical drawing of the two cylindrical pipes?

- Ans
- ☒ A. Use only standard orthographic projection without auxiliary views
 - ☒ B. Draw a simple circle at the junction in the top view
 - ☒ C. Represent the intersection as a straight line in the side view
 - ☒ D. Draw the true shape of the intersection using auxiliary projection

Q.35 A father distributed two different amounts among his sons P, Q, R and S. First amount was distributed in the ratio 5 : 4 : 3 : 2 and the second amount was distributed in the ratio 6 : 7 : 8 : 9. If the second amount is thrice the first amount, then which son will get the maximum amount?

- Ans ☒ A. S
- ☐ B. Q
- ☐ C. P
- ☐ D. R

Q.36 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 one out is not based on the number of consonants/vowels or their position in the letter-cluster.)

- Ans ☐ A. TN-ZD
- ☐ B. WQ-CG
- ☐ C. EY-KO
- ☒ D. QK-VA

Q.37 Select the pair which follows the same pattern as that followed by the two pairs given below. Both pairs follow the same pattern.

BIP : EMU
GNU : JRZ

- Ans ☒ A. FMT : IQY
- ☐ B. XDE : PON
- ☐ C. VCD : GRD
- ☐ D. CGW : NHT

Q.38 Refer to the following letter series and answer the question that follows. Counting to be done from left to right only.

(Left) A T D E B R C L M Q O N P J M Q E A O Z W F U K S L (Right)

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

- Ans ☐ A. 2
- ☐ B. 0
- ☒ C. 3
- ☐ D. 1

Q.39 If Rohan's income increases by 20% and his expenditure increases by 10%, then his savings increase by ₹1,200. If his original income was ₹12,000, what was his original expenditure? (Assume that savings = income – expenditure.)

- Ans ☐ A. ₹11,000
- ☐ B. ₹9,000
- ☐ C. ₹10,000
- ☒ D. ₹12,000

Q.40 In a certain code language, 'KING' is coded as '9713' and 'ITCH' is coded as '2945'. What is the code for 'I' in the given code language?

- Ans ☒ A. 9
- ☐ B. 2
- ☐ C. 4
- ☐ D. 7

Q.41	What is the best description of the purpose of multi-view drawing in engineering drawing?
Ans	A. To show different colors of an object for better visual appearance B. To present the object in a single three-dimensional visual form only C. To represent different sides of an object clearly on a flat surface D. To view an object from only one direction
Q.42	What do touch gestures in Microsoft Windows allow users to do?
Ans	A. Connect external devices B. Perform actions using finger movements C. Type faster on the keyboard D. Increase screen brightness
Q.43	Two students move identical boxes through a distance of 10 m. Student A applies a force of 50 N, while Student B applies a force of 100 N. What is the difference in the work done by the two students?
Ans	A. 1000 J B. 0 J C. 50 J D. 500 J
Q.44	In this question, a question is followed by two statements numbered (I) and (II). You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and decide the appropriate answer. Among the five poles—I, N, C, H, and L—each having a different height, which pole is the tallest? (I) I is shorter than N but taller than C. C is taller than only one pole. (II) H is taller than L.
Ans	A. Data in statement I alone is sufficient to answer the question while data in statement II is not B. Both statements I and II together (and not statement I alone or statement II alone) are sufficient to answer the question C. Data in statement II alone is sufficient to answer the question while data in statement I is not D. Both statements I and II together are NOT sufficient to answer the question
Q.45	A trader marks an article 25% above its cost price. He allows a discount of 10% on the marked price. After giving the discount, he makes a profit of ₹180 on the article. What is the cost price of the article?
Ans	A. ₹1,200 B. ₹1,260 C. ₹1,440 D. ₹1,380
Q.46	Namia is facing the west. She turns left and walks 15 m. She turns left and walks 25 m. She again turns left and walks 40 m. She finally turns left and walks 40 m to reach home. In which direction is her home with respect to the starting point?
Ans	A. South-East B. South-West C. North-West D. North-East
Q.47	Find the LCM of 72, 78, and 90.
Ans	A. 4120 B. 4280 C. 4680 D. 4250

Q.48	A laboratory record shows a distance of 0.004 kilometers between two points. How should this be written in SI units of length for a scientific report?
Ans	☒ A. 4 m ☐ B. 4000 mm ☐ C. 400 cm ☐ D. 0.4 m
Q.49	Which is the most important safety check before operating any machine in a workshop?
Ans	☐ A. Ensure the machine area is properly illuminated ☐ B. Check if the machine is plugged in properly ☐ C. Wipe the machine with a dry cloth before use ☒ D. Inspect the machine for loose or damaged parts
Q.50	Which of the following best defines 'work' in physics?
Ans	☐ A. Work is done if a force acts at any angle to the motion. ☐ B. Work is done whenever a force is applied, regardless of movement. ☒ C. Work is done when a force moves an object in the direction of the force. ☐ D. Work is done when energy is stored in an object.
Q.51	16 is related to 260 following a certain logic. Following the same logic, 25 is related to 630. To which of the following is 9 related, following the same logic? (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.)
Ans	☐ A. 78 ☐ B. 732 ☐ C. 729 ☒ D. 84
Q.52	A conical tent has a base radius of 14 m and a height of 48 m. How many cubic meters of air can it hold? (Use $\pi = \frac{22}{7}$)
Ans	☒ A. 9856 ☐ B. 9865 ☐ C. 8956 ☐ D. 9568
Q.53	Seven boxes, P, Q, S, T, U, V, and W, are kept one over the other, but not necessarily in the same order. Only three boxes are kept above S. Exactly one box is kept between T and S. Exactly three boxes are kept between T and U, and U is kept somewhere above S. V is kept immediately below U. W is kept at one of the places above P. Q is not kept immediately above or below T. Based on the given information, which box is kept at the lowermost position?
Ans	☒ A. P ☐ B. S ☐ C. Q ☐ D. V
Q.54	A worker's hand is at risk of injury from a mechanical shearing action. Which situation best describes a shearing hazard?
Ans	☐ A. A hand touching a hot metallic machine surface during maintenance activity ☐ B. A hand becoming entangled in a rotating machine shaft during operation ☐ C. A hand sliding repeatedly across a rough abrasive machine surface during work ☒ D. A hand caught between a moving blade and a fixed machine surface during operation

Q.55	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? 28 A 16 C 3 B 12 D 4 = ?
Ans	☒ A. 73 ☐ B. 70 ☐ C. 71 ☐ D. 72
Q.56	A tangent PQ at a point P of a circle of radius 5 cm meets a line through the center O at a point Q such that OQ = 12 cm. What is the length of PQ?
Ans	☐ A. $\sqrt{117}$ cm ☒ B. $\sqrt{119}$ cm ☐ C. $\sqrt{97}$ cm ☐ D. $\sqrt{107}$ cm
Q.57	A car of mass 1200 kg accelerates from rest to a speed of 20 m/s on a straight road. If the kinetic energy gained by the car is completely due to the work done by the engine, which of the following best represents the total kinetic energy acquired by the car at this speed?
Ans	☐ A. 24,000 joules ☒ B. 240,000 joules ☐ C. 480,000 joules ☐ D. 12,000 joules
Q.58	What is the simplified value of the expression $\left[\frac{\cos A}{(1 - \tan A)} \right] + \left[\frac{\sin A}{(1 - \cot A)} \right]$?
Ans	☒ A. $\cos A + \sin A$ ☐ B. $\sin A - \cos A$ ☐ C. 0 ☐ D. 1
Q.59	Which integrated strategy best addresses soil pollution, falling crop yields, and low microbial activity near an industrial zone?
Ans	☐ A. Reforestation in nearby urban centers. ☐ B. Ban all regional chemical fertilizers. ☒ C. Control industrial waste for sustainability. ☐ D. Expand urban areas into farmland.
Q.60	An engineer uses fault tree analysis to assess a machine-related injury in a factory. Which step should be taken first according to standard procedure?
Ans	☐ A. List all possible causes of failures ☒ B. Define the top event representing the injury ☐ C. Validate the analysis using workplace data ☐ D. Establish preventive measures to control risks
Q.61	Which situation best describes an entanglement hazard in a mechanical workshop?
Ans	☐ A. Gloves worn near hot surfaces ☒ B. Loose clothing caught in a rotating shaft ☐ C. Hand pinched between gears ☐ D. Finger cut by a sharp edge

Q.62	Which line symbol is commonly used in engineering drawings to represent a hidden edge that is not directly visible?
Ans	✖ A. Zigzag line ✖ B. Solid thick line ✖ C. Chain thin line ✔ D. Dashed line
Q.63	What should come in place of the question mark (?) in the given series? 98, 104, 116, 134, 158, ?
Ans	✖ A. 186 ✖ B. 190 ✔ C. 188 ✖ D. 184
Q.64	The simple interest earned on a certain sum of money for 3 years at 15% per annum is ₹2,700. Find the sum.
Ans	✔ A. ₹6,000 ✖ B. ₹8,000 ✖ C. ₹9,000 ✖ D. ₹5,000
Q.65	In this question, a question is followed by two statements numbered (I) and (II). You have to decide whether the data provided in the statements are sufficient to answer the question. Read both the statements and decide the appropriate answer. Q. Among five people – A, B, C, D, and E – who is the tallest? (I) A is taller than B. B is taller than C. (II) D is taller than E.
Ans	✖ A. Data in statement II alone is sufficient to answer the question while data in statement I is not ✖ B. Both statements I and II together (and not statement I alone or statement II alone) are sufficient to answer the question ✔ C. Both statements I and II together are NOT sufficient to answer the question. ✖ D. Data in statement I alone is sufficient to answer the question while data in statement II is not
Q.66	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 one out is not based on the number of consonants/vowels or their position in the letter-cluster.)
Ans	✔ A. CH – EK ✖ B. DJ – GM ✖ C. AF – DI ✖ D. BG – EJ
Q.67	Which of the following scenarios best demonstrates the conversion of chemical energy to mechanical energy?
Ans	✖ A. A flashlight turns on after inserting new batteries ✖ B. A stone falls off a table to the ground ✔ C. A runner uses stored energy from food to sprint forward ✖ D. A stretched rubber band snaps back to its original shape
Q.68	Which component makes up the largest proportion of Earth's atmosphere by volume?
Ans	✖ A. Carbon dioxide ✖ B. Argon ✔ C. Nitrogen ✖ D. Oxygen

Q.69	Three workers, X, Y, and Z, can complete a certain job in 10 days, 12 days, and 15 days, respectively. Determine the number of days required for them to complete the job when they work together.
Ans	 A. 5 days  B. 4 days  C. 6 days  D. 8 days
Q.70	Which of the following best describes a key environmental concern associated with improper disposal of e-waste?
Ans	 A. Release of toxic metals into soil and water  B. Release of greenhouse gases from decomposition  C. Enhanced biodegradation of plastics  D. Increased recycling rates of precious metals
Q.71	Which feature is a requirement of the BIS drawing standard in engineering drawings?
Ans	 A. Use of colored pencils for clarity  B. Freehand sketches without scale  C. Title block with specific information  D. Margin lines of random width
Q.72	PJAE is related to JOWH in a certain way based on the English alphabetical order. In the same way, OIVC is related to INRF. To which of the following is NEZF related to following the same logic?
Ans	 A. IKUH  B. HKVJ  C. HJVI  D. IJVJ
Q.73	The median of the following data is : 25, 15, 23, 25, 17, 27, 20, 18, 24, 30, 19, 28, 35, 10, 31, 40
Ans	 A. 23.5  B. 20.5  C. 24.5  D. 25
Q.74	Which of the following is both, an input and output device?
Ans	 A. Projector  B. Printer  C. Touchscreen monitor  D. Keyboard
Q.75	What is the typical temperature range covered by a laboratory thermometer used in school experiments?
Ans	 A. Zero to two hundred degrees Celsius  B. Minus ten to one hundred and ten degrees Celsius  C. Minus fifty to fifty degrees Celsius  D. Thirty five to forty two degrees Celsius

Q.76 A trader buys 187 pens at ₹23 each. During transportation, 7 pens get damaged and cannot be sold. He sells the remaining pens at ₹27 each. Find his profit percentage. (rounded off to one decimal place)

- Ans
- ☒ A. 12.6%
 - ☒ B. 13.7%
 - ☒ C. 13.0%
 - ☒ D. 14.1%

Q.77 A shopkeeper marks a product 75% above cost price and offers two successive discounts of 30% and 40%. What is the profit or loss percentage?

- Ans
- ☒ A. 15.7% profit
 - ☒ B. 26.5% loss
 - ☒ C. 22.6% profit
 - ☒ D. 20.9% profit

Q.78 A pendulum takes 60 seconds to complete 24 oscillations. If its length is increased and it now takes 72 seconds for the same number of oscillations, what has happened to its time period?

- Ans
- ☒ A. It has decreased to 1.5 seconds
 - ☒ B. It has decreased to 2.0 seconds
 - ☒ C. It has increased to 3.0 seconds
 - ☒ D. It remains at 2.5 seconds

Q.79 A runner completes one lap of a 200 meter circular track in 50 seconds. What is the average speed of the runner?

- Ans
- ☒ A. 4.5 meter per second
 - ☒ B. 3 meter per second
 - ☒ C. 3.5 meter per second
 - ☒ D. 4 meter per second

Q.80 If the mean of the following data is 40, then what is the value of x?

Class	10-20	20-30	30-40	40-50	50-60
Frequency	30	27	44	29	X

- Ans
- ☒ A. 82
 - ☒ B. 99
 - ☒ C. 93
 - ☒ D. 98

Q.81 What should come in place of the question mark (?) in the given series based on the English alphabetical order?

UMD ZQG EUJ JYM ?

- Ans
- ☒ A. NDO
 - ☒ B. PDP
 - ☒ C. NBQ
 - ☒ D. OCP

Q.82	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? 31 B 35 D 7 A 9 C 2 = ?
Ans	✖ A. 48 ✖ B. 42 ✖ C. 46 ✔ D. 44
Q.83	A sample of water is heated from 15 degrees Celsius to 35 degrees Celsius. What is the temperature change in Kelvin?
Ans	✖ A. The temperature change is 15 K. ✔ B. The temperature change is 20 K. ✖ C. The temperature change is 30 K. ✖ D. The temperature change is 50 K.
Q.84	Which of the following statements correctly reflects the characteristics of a Local Area Network (LAN) and the role of Ethernet within it?
Ans	✖ A. A LAN always requires Gigabit Ethernet to function and is insecure because it allows open access to all network devices. ✖ B. Ethernet in a LAN provides low-speed data transfer and connects users over public Internet infrastructure. ✖ C. LANs are designed for long-distance communication and use Ethernet primarily for wireless data exchange. ✔ D. Ethernet is a standard that governs how devices in a LAN communicate via wired connections, supporting speeds from 10 Mbps to 1000 Mbps.
Q.85	Refer to the following letter and symbol series and answer the question that follows. Counting to be done from left to right. (Left) Z @ B R J # D * Q A M S % P L V O U S N T W Z (Right) How many such symbols are there, each of which is immediately preceded by a letter and also immediately followed by a letter?
Ans	✔ A. Four ✖ B. None ✖ C. Three ✖ D. Two
Q.86	A car travels 90 km east and then 30 km west along the same straight road. If the entire journey takes 3 hours, what is the average velocity of the car?
Ans	✔ A. 20 km/h east ✖ B. 40 km/h east ✖ C. 30 km/h east ✖ D. 50 km/h north
Q.87	An engineer is tasked with creating the front view of a mechanical part. The part has a rectangular base with a vertical circular hole passing through it and a triangular prism attached on top. Which of the following best describes what will be visible in the front view?
Ans	✖ A. Only the rectangular base outline will be visible in the front view drawing ✔ B. The outline of rectangular base and triangular prism will be visible but hole is not shown ✖ C. The outline of triangular prism and circular hole will be visible in front view only ✖ D. Only the triangular prism will be clearly visible in the front view drawing

Q.88 The circumference of the base of a solid right circular cylinder is 88 cm and its height is 150 cm. What is the volume (in cm³) of the cylinder?

(Take $\pi = \frac{22}{7}$)

- Ans
- ☐ A. 92500
 - ☒ B. 92400
 - ☐ C. 92550
 - ☐ D. 92450

Q.89 In how many years will a sum of ₹16,000 at 10% per annum compounded semi-annually become ₹18,522?

- Ans
- ☐ A. 2 years
 - ☐ B. 2.5 years
 - ☐ C. 1 year
 - ☒ D. 1.5 years

Q.90 Refer to the given letter series and answer the question that follows. Counting to be done from left to right.

(Left) B F O P P S Q A L M K A W X S N U Q J O M Y (Right)

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

- Ans
- ☐ A. 7
 - ☒ B. 5
 - ☐ C. 6
 - ☐ D. 4

Q.91 In a spreadsheet application, a user selects a range of cells and presses Ctrl + C, followed by Ctrl + V in a different worksheet. What happens to the data?

- Ans
- ☐ A. The selected cells are deleted from the original worksheet.
 - ☐ B. The selected cells are saved to a new file.
 - ☐ C. The selected cells are moved to the new worksheet.
 - ☒ D. The selected cells are copied to the new worksheet.

Q.92 If a scooter travels at a constant speed of 25 km per hour, how far will it travel in 4 hours?

- Ans
- ☐ A. 80 km
 - ☐ B. 120 km
 - ☒ C. 100 km
 - ☐ D. 75 km

Q.93 Which of the following letter-number clusters will replace the question mark (?) in the given series to make it logically complete?

QOI 5, OMG 10, MKE 15, KIC 20, ?

- Ans
- ☒ A. IGA 25
 - ☐ B. HIZ 30
 - ☐ C. JHZ 24
 - ☐ D. IHS 23

Q.94	A car travels 60 km north in 2 hours, then 40 km south in the next 1 hour. What is the car's average velocity over the entire trip?
Ans	 A. 6.7 km/h north  B. 33.3 km/h north  C. 20 km/h south  D. 0 km/h
Q.95	A thermometer shows a reading of 37 degrees Celsius. What is the corresponding temperature in Kelvin?
Ans	 A. 300 K  B. 320 K  C. 310 K  D. 270 K
Q.96	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'. How is Shreya related to Mahak if 'Shreya + Dev – Taran × Harshit % Mahak'?
Ans	 A. Mother's sister  B. Father's sister  C. Father's mother  D. Mother's mother
Q.97	A sum of ₹420 is divided among A, B, C, and D such that: A : B = 4 : x, B : C = x : 7, C : D = 6 : (x – 3). If B and C together get ₹210, find the value of x.
Ans	 A. 27  B. 53  C. 42  D. 39
Q.98	G is the mother of Y. Y is the sister of V. S is the father of L. L is the husband of V. How is G related to S?
Ans	 A. Son's wife's mother  B. Mother's mother  C. Son's wife  D. Son's wife's sister
Q.99	A roller coaster at the top of its track has maximum potential energy. As it descends and speeds up, what principle explains why the sum of its kinetic and potential energies remains constant if we ignore friction and air resistance?
Ans	 A. Law of inertia  B. Law of conservation of energy  C. Principle of superposition  D. Principle of inertia

Q.100 There are two types of silver–copper alloys. The first alloy contains $93\frac{1}{3}\%$ silver, while the second alloy contains $86\frac{2}{3}\%$ silver. Find the amount of the first alloy that should be mixed with some quantity of the second alloy to obtain a 100 kg mixture containing 90% silver.

- Ans**
- ☐ A. 45 kg
 - ☐ B. 52 kg
 - ☐ C. 48 kg
 - ☒ D. 50 kg

Section : **PART-B**

Q.1 Which safety action shall be completed first before replacing a blown fuse in an electrical circuit?

- Ans**
- ☐ A. Replace the fuse with a copper wire
 - ☐ B. Replace the fuse with a higher current rating
 - ☒ C. Switch OFF the circuit supply
 - ☐ D. Touch the fuse terminals to confirm the fault

Q.2 How many pins are present on a standard PATA ribbon cable header for desktop hard drives?

- Ans**
- ☐ A. 50 pins
 - ☒ B. 40 pins
 - ☐ C. 68 pins
 - ☐ D. 34 pins

Q.3 Which antenna is best suited for directional communication over long distances?

- Ans**
- ☐ A. Monopole antenna
 - ☐ B. Dipole antenna
 - ☐ C. Isotropic antenna
 - ☒ D. Parabolic antenna

Q.4 Which electrical quantity is defined as the potential difference between two points in an electrical circuit?

- Ans**
- ☒ A. Voltage
 - ☐ B. Power
 - ☐ C. Resistance
 - ☐ D. Current

Q.5 You measure an intact SMD diode in the high-frequency switching stage of an LED driver. The multimeter forward voltage drop reads 0.240 V. What specific type of diode does this low voltage threshold identify?

- Ans**
- ☐ A. Zener Diode
 - ☐ B. Light Emitting Diode (LED)
 - ☐ C. Standard Silicon Rectifier Diode
 - ☒ D. Schottky Diode

Q.6 A technician connects a load to the output of a half-wave rectifier without using a filter. What is the nature of the voltage across the load?

- Ans**
- ☐ A. Pure DC voltage
 - ☐ B. Alternating voltage
 - ☒ C. Pulsating DC voltage
 - ☐ D. Pulsating AC voltage

Q.7	If the equivalent inductance in a Hartley oscillator is doubled, the frequency is:
Ans	☐ A. Increased by $\sqrt{2}$ ☐ B. Halved ☒ C. Reduced by $\sqrt{2}$ ☐ D. Doubled
Q.8	When a zero crossing detector is used to measure the frequency of a periodic AC signal, what quantity must be counted?
Ans	☐ A. The phase difference between input and output signals ☐ B. The average voltage level of the output signal ☐ C. The number of input voltage peaks per cycle ☒ D. The number of output transitions per unit time
Q.9	How does Hard Disk store data in a desktop computer?
Ans	☐ A. Paper tape ☒ B. Magnetic platters ☐ C. Optical discs ☐ D. Flash chips only
Q.10	The working principle of a crystal oscillator is based on:
Ans	☒ A. Piezoelectric effect ☐ B. Hall effect ☐ C. Thermionic emission ☐ D. Photoelectric effect
Q.11	During a laboratory test, a trainee builds an RS flip-flop using NOR gates (active-HIGH inputs). Initially, the output Q = 0. The trainee applies S = 1 (Set input) and R = 0 (Reset input). After this, both inputs are returned to S = 0 and R = 0. What will happen to the output Q?
Ans	☐ A. Q will continuously toggle between 0 and 1. ☐ B. Q will return to 0 after inputs become 0. ☒ C. Q will remain at 1 after inputs become 0, holding the last state. ☐ D. Q will become invalid when inputs return to 0.
Q.12	Which set of terminals is commonly used to connect a Field Effect Transistor in a circuit?
Ans	☐ A. Emitter, Collector, Base ☐ B. Positive, Negative, Neutral ☐ C. Anode, Cathode, Grid ☒ D. Gate, Drain, Source
Q.13	Why are optical fibers less susceptible to electromagnetic interference compared to copper wires?
Ans	☐ A. They are thicker than copper wires ☐ B. They are covered with metal ☐ C. They have higher resistance ☒ D. They use light instead of electrical signals

Q.14 During the operation of a two-phase stepper motor, one of its phase windings becomes disconnected. What is the most likely effect on the performance of the motor?

- Ans
- ☒ A. The motor will continue to operate normally with full torque.
 - ☒ B. The motor will experience a significant reduction in torque and may fail to step accurately.
 - ☒ C. The motor efficiency will improve due to reduced power consumption.
 - ☒ D. The motor will rotate at twice its rated speed.

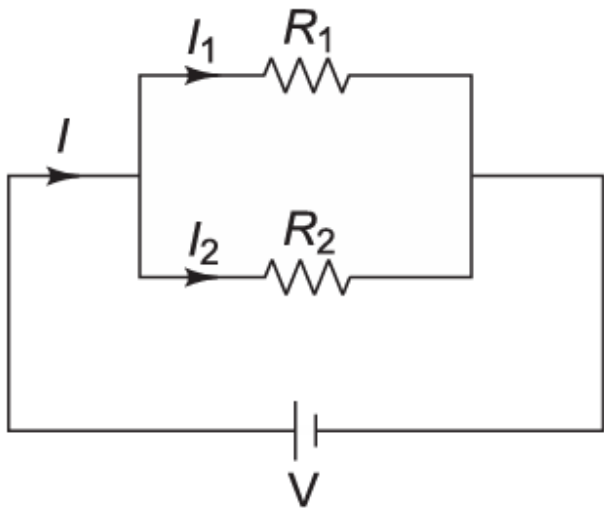
Q.15 Which trigonometric ratio represents the opposite side divided by the hypotenuse in a right triangle?

- Ans
- ☒ A. Tangent
 - ☒ B. Sine
 - ☒ C. Cotangent
 - ☒ D. Cosine

Q.16 Which component provides power to the motherboard and other devices?

- Ans
- ☒ A. RAM
 - ☒ B. Heat Sink
 - ☒ C. SMPS
 - ☒ D. HDD

Q.17 Two resistors of $8\ \Omega$ and $24\ \Omega$ are connected in parallel across a $12\ \text{V}$ supply, as shown in the following figure. What is the total current drawn from the source?



- Ans
- ☒ A. 1 A
 - ☒ B. 0.5 A
 - ☒ C. 2 A
 - ☒ D. 4 A

Q.18 Which feature best distinguishes a stud extractor from an open-end spanner in its intended application?

- Ans
- ☒ A. A stud extractor requires external heating before use, while an open-end spanner does not.
 - ☒ B. A stud extractor is longer than an open-end spanner, providing greater torque.
 - ☒ C. A stud extractor grips and removes a stud, while an open-end spanner fits the flats of a bolt.
 - ☒ D. A stud extractor is used only for tightening, while an open-end spanner is used only for loosening.

Q.19 A semiconductor sample shows conduction mainly due to holes, while electrons exist only in small numbers due to thermal generation. Identify the semiconductor type.

- Ans
- ☒ A. N-type semiconductor at room temperature
 - ☒ B. Intrinsic semiconductor at room temperature
 - ☒ C. P-type semiconductor at room temperature
 - ☒ D. Intrinsic semiconductor at 0 K

Q.20	Which internal hardware component of an LCD TV is responsible for regulating, filtering, and distributing the appropriate low-voltage direct current (DC) operational power rails required by the main logic board and the panel timing controller?
Ans	☐ A. T-CON microprocessing chip ☐ B. Liquid Crystal Display (LCD) shutter matrix ☐ C. Low-Voltage Differential Signaling (LVDS) interface ☒ D. Switch-Mode Power Supply (SMPS) board
Q.21	While free-hand sketching a circular pipe from a very steep viewing angle, the circular end appears as a narrow ellipse. Which statement is correct?
Ans	☐ A. Both axes reduce equally, forming a smaller circle ☐ B. The major axis becomes twice the true diameter, while the minor axis remains unchanged ☒ C. The major axis equals the true diameter, while the minor axis becomes very small ☐ D. The minor axis equals the true diameter, while the major axis becomes very small
Q.22	Which factor determines the selection of a soldering iron tip for a solder joint?
Ans	☐ A. The storage condition of the soldering iron ☒ B. The size and type of the solder joint ☐ C. The frequency of tip cleaning ☐ D. The color of the soldering iron handle
Q.23	A technician connecting a desktop PC to a network switch in a modern office environment should use a _____ cable terminated with _____ connectors to establish a stable local connection.
Ans	☒ A. twisted pair; RJ45 ☐ B. fiber optic; SC ☐ C. USB; Type A ☐ D. coaxial; BNC
Q.24	During a lab experiment, the current through a magnetizing coil is increased, while the magnetic path length remains unchanged. What will happen to the magnetic field strength?
Ans	☐ A. It becomes zero ☐ B. It decreases ☒ C. It increases ☐ D. It remains constant
Q.25	In an n-channel enhancement mode MOSFET, what must be applied to the gate terminal relative to the source to turn the device on?
Ans	☐ A. A zero voltage ☐ B. A negative voltage ☐ C. A gate current ☒ D. A positive voltage
Q.26	In engineering drawing practice, which lettering convention is preferred for marking part numbers to maintain clarity, readability, and uniformity?
Ans	☐ A. Use lowercase letters for small-sized part numbers to save space ☐ B. Use a mixture of uppercase and lowercase letters for all part numbers ☐ C. Use lowercase letters for part numbers to reduce writing effort ☒ D. Use uppercase letters for all part numbers to maintain standardization

Q.27	In a Pulse Width Modulation (PWM) signal, the duty cycle is defined as:
Ans	☐ A. Variation in the amplitude of the pulses ☐ B. Variation in the frequency of the pulses ☐ C. Phase difference between input and output signals ☒ D. Ratio of the pulse ON-time (width) to the total time period of the signal
Q.28	What is the first safety step before dismantling a desktop computer?
Ans	☒ A. Switch off and unplug the power supply ☐ B. Remove RAM from all RAM slots ☐ C. Open the cabinet ☐ D. Disconnect data cables
Q.29	Which of the following statements about HDDs is correct in computer hardware technology?
Ans	☒ A. HDDs store data on spinning magnetic disks ☐ B. HDDs use flash memory to store data ☐ C. HDDs are used for temporary storage only ☐ D. HDDs use optical discs for storage
Q.30	Which of the following is a type of RC Oscillator?
Ans	☐ A. Hartley Oscillator ☐ B. Crystal Oscillator ☐ C. Colpitts Oscillator ☒ D. Phase Shift Oscillator
Q.31	What happens if an amplifier is not properly biased?
Ans	☐ A. It always turns off the amplifier ☐ B. It improves efficiency ☐ C. It increases output power ☒ D. It may cause distortion
Q.32	During circuit testing across a PN junction diode, a technician finds that holes are responsible for electrical conduction in a semiconductor. Which region of a PN junction diode does this indicate?
Ans	☐ A. Depletion region ☐ B. Intrinsic region ☐ C. N-type region ☒ D. P-type region
Q.33	In a JK flip flop, the J input mainly performs which function when K = 0 and the clock is active?
Ans	☒ A. The Set input ☐ B. The Reset input ☐ C. The Clock input ☐ D. The Toggle input
Q.34	How should screws be tightened when mounting a Hard Disk Drive (HDD) in a desktop computer?
Ans	☐ A. Tighten only one side ☐ B. Leave screws slightly loose for HDD to move freely ☒ C. Tighten screws evenly and firmly without over-tightening ☐ D. Tighten as much as possible with full force

Q.35	What is the configuration called when the emitter terminal of a transistor is common to both input and output circuits?
Ans	☐ A. Common base ☐ B. Emitter follower ☐ C. Common collector ☒ D. Common emitter

Q.42	Which connection interface should be used to link a high-definition (HD) digital set-top box to a modern LED or LCD TV to transmit both uncompressed digital video and multi-channel audio through a single cable while supporting Consumer Electronics Control (CEC) to operate both devices with a single remote?
Ans	☐ A. Composite Video (RCA) ☐ B. Component Video (YPbPr) ☒ C. HDMI ☐ D. S-Video
Q.43	Which operational amplifier configuration is commonly used in zero crossing detectors?
Ans	☐ A. Non-inverting amplifier with positive feedback is used. ☐ B. Inverting amplifier with negative feedback is used. ☐ C. Integrator circuit with resistive feedback is used. ☒ D. Comparator configuration without feedback is used.
Q.44	In a three-phase, four-wire electrical distribution system, the fourth pole of a four-pole Miniature Circuit Breaker (MCB) is generally used for switching and protecting which conductor?
Ans	☐ A. Earth conductor ☐ B. Control circuit conductor ☒ C. Neutral conductor ☐ D. Pilot wire
Q.45	Which motherboard component is used to connect storage devices like HDD or SSD in desktop computer system?
Ans	☒ A. SATA port ☐ B. RAM slot ☐ C. USB port ☐ D. PCIe slot
Q.46	What is the resistance value of a surface-mount resistor marked '472' according to SMD resistor code conventions?
Ans	☐ A. 470 ohms ☒ B. 4700 ohms ☐ C. 4.7 ohms ☐ D. 47000 ohms
Q.47	A work area contains flammable chemicals and moving machinery. Which combination of safety signs is most appropriate for these hazards?
Ans	☐ A. Caution signs for chemicals and warning signs for exits ☐ B. Danger signs for machinery and caution signs for chemicals ☐ C. Warning signs for chemicals and caution signs for machinery ☒ D. Danger signs for chemicals and warning signs for machinery
Q.48	What is the main function of the sensors in an IoT system?
Ans	☐ A. To store large amounts of information ☒ B. To collect data from the environment ☐ C. To process collected data ☐ D. To perform an action that changes the environment

Q.49 In a single-phase fan or motor circuit used in workshop practice, why is a capacitor connected in series with the auxiliary winding?

- Ans**
- ☒ A. To increase conductor resistance permanently
 - ☒ B. To produce phase difference for better starting torque
 - ☒ C. To act as a fuse during overload
 - ☒ D. To reduce the supply frequency

Q.50 How does the construction of a MOSFET help to achieve high input impedance?

- Ans**
- ☒ A. The gate is insulated from the channel by a thin oxide layer
 - ☒ B. The gate uses a resistive layer to limit current
 - ☒ C. The gate is connected directly to the channel
 - ☒ D. The device has a thick substrate for support

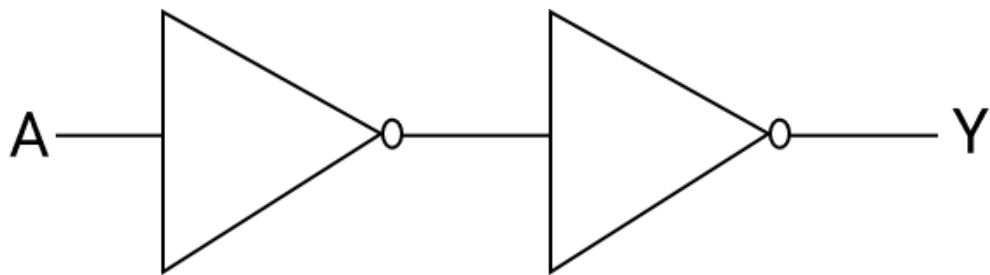
Q.51 What does 'hand off' mean in the context of cell phones?

- Ans**
- ☒ A. Make a new phone call
 - ☒ B. Charge the phone battery
 - ☒ C. Turn off the cell phone
 - ☒ D. Handover a call from one cell to another

Q.52 What is the function of an HDMI port when connecting an external source device to an LED or LCD TV?

- Ans**
- ☒ A. To step down the main AC power voltage to safely operate the internal TV logic boards
 - ☒ B. To convert incoming analog video signals into digital formats inside the TV panel
 - ☒ C. To transmit uncompressed digital video and multi-channel audio simultaneously through a single cable
 - ☒ D. To automatically increase the native optical refresh rate of the liquid crystal display pixels

Q.53 What is the output Y of the following digital circuit if the input A = 1?
(Note: Both the logic gates shown in the diagram are NOT gates.)



- Ans**
- ☒ A. 0
 - ☒ B. High Impedance State
 - ☒ C. Undefined
 - ☒ D. 1

Q.54 In a Common-Base (CB) transistor amplifier, the phase difference between the input voltage (emitter–base) and the output voltage (collector–base) is:

- Ans**
- ☒ A. 180°
 - ☒ B. 90°
 - ☒ C. 0°
 - ☒ D. 45°

Q.55 If the input resistor of an inverting amplifier using OP-AMP is doubled and the feedback resistor remains the same, what happens to the magnitude of voltage gain?

- Ans**
- ☒ A. It is halved
 - ☒ B. It doubles
 - ☒ C. Stays the same
 - ☒ D. Becomes one fourth

Q.56	Which of the following components are used to determine the frequency of oscillation in a Colpitts oscillator?
Ans	☐ A. Diodes and resistors ☒ B. Capacitors and inductor ☐ C. Resistors and capacitors ☐ D. Inductor and resistors
Q.57	A wire of some material has resistance 10 ohm at a certain length. To make its resistance 5 ohm using the same material and same cross-sectional area, what should be the new length?
Ans	☒ A. Half of the original length ☐ B. Double the original length ☐ C. Same as the original length ☐ D. One fourth of the original length
Q.58	Which of the following is NOT a sensor performance characteristic?
Ans	☐ A. Range ☒ B. Cost ☐ C. Sensitivity ☐ D. Linearity
Q.59	What is the phase shift required in RC phase shift oscillator from the entire feedback RC network to produce oscillations?
Ans	☐ A. 90 degrees ☒ B. 180 degrees ☐ C. 360 degrees ☐ D. 270 degrees
Q.60	When following the proper procedure to read voltage using a PMMC Voltmeter, which type of voltage can be measured accurately?
Ans	☐ A. Alternating current (AC) voltage only ☐ B. Both AC and DC voltage accurately ☒ C. Direct current (DC) voltage only ☐ D. High-frequency AC voltage only
Q.61	What problem can occur with a Digital Storage Oscilloscope (DSO) if its sampling rate is too low for a high-frequency signal, compared to an analog CRO?
Ans	☐ A. The entire display screen will permanently turn off due to over-sampling. ☐ B. The input signal will automatically switch to a direct current measurement mode. ☐ C. The analog input probe tips will melt due to excessive heat generation. ☒ D. Aliasing error, where the displayed waveform appears as an incorrect low-frequency signal shape.
Q.62	Which component is used to set biasing in a transistor amplifier but, if omitted, leads to unstable operation?
Ans	☐ A. Transformer ☐ B. Inductor ☒ C. Resistor network ☐ D. Diode

Q.63	Which phase relationship exists between input and output signals in a Common Emitter amplifier?
Ans	☐ A. Output is in phase with input ☒ B. 180° phase shift ☐ C. Output leads input by 90° ☐ D. Output lags input by 90°
Q.64	A standard multiplexed 6 by 4 LED matrix contains a total of _____ independent light-emitting nodes, which can be fully operated using a minimum of _____ microcontroller control pins.
Ans	☐ A. 24; 24 ☐ B. 10; 24 ☐ C. 48; 48 ☒ D. 24; 10
Q.65	Which of the following is a primary criterion when choosing a sensor for monitoring temperature in a manufacturing process?
Ans	☐ A. Color of the sensor housing ☐ B. Overall cost of the sensor ☒ C. Accuracy of the sensor readings ☐ D. Physical size of the sensor
Q.66	A 1 kHz square wave signal is applied to the input A of a NOT gate. What will be observed at the output of the NOT gate?
Ans	☐ A. A 1 kHz square wave signal identical to the input ☒ B. A 1 kHz square wave signal inverted (complemented) with respect to the input ☐ C. A constant LOW (0) signal ☐ D. A constant HIGH (1) signal
Q.67	In an 8051 microcontroller, during a debugging session, several PUSH instructions are executed, and the stack pointer reaches address 31H. Which memory area is now being used for stack storage?
Ans	☐ A. Register bank area ☐ B. Program memory area ☐ C. Bit-addressable RAM area ☒ D. General-purpose RAM area
Q.68	While diagnosing an NPN BJT in a SOT-23 package, your multimeter positive probe (+) is locked on the Base (Pin 1). Measuring to Pin 3 reads 0.6 V, while measuring to Pin 2 reads 0.68 V. Which pin is the Emitter?
Ans	☐ A. Neither pin; the transistor is broken because the readings don't match. ☒ B. Pin 2 is the Emitter, because it has the higher voltage drop. ☐ C. Both pins are identical and can be used interchangeably. ☐ D. Pin 3 is the Emitter, because it has the lower voltage drop.
Q.69	A technician notices the relay in a stabilizer frequently clicks on and off rapidly when connected to an SMPS. What is the most probable issue?
Ans	☐ A. The relay is stuck in one position ☒ B. The input voltage is fluctuating rapidly ☐ C. The stabilizer has a blown fuse ☐ D. The SMPS is overloaded



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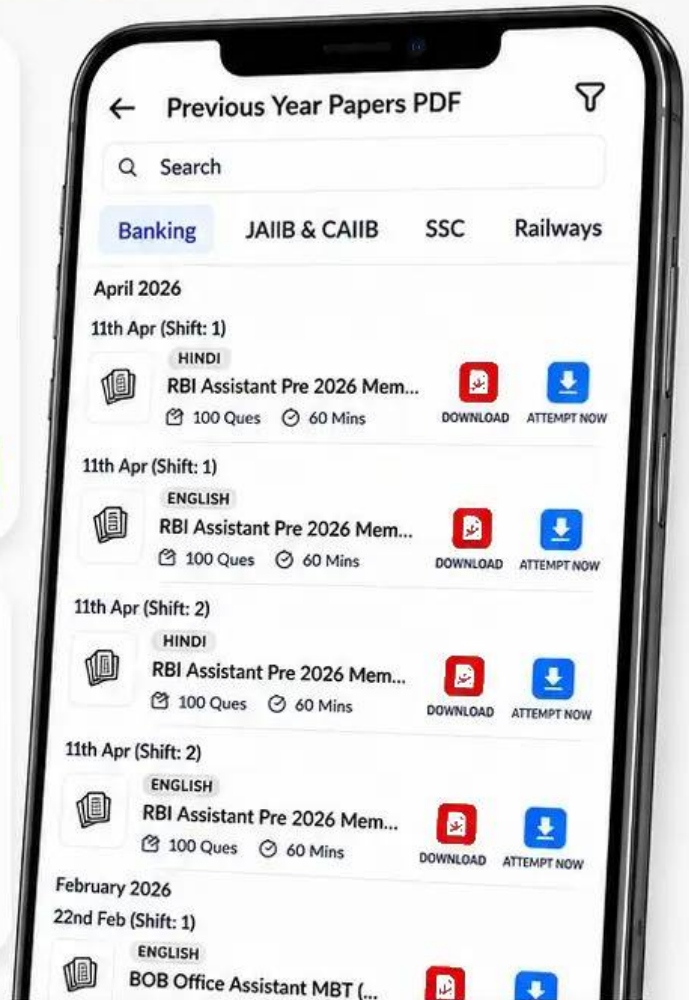
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Q.70	While designing a system using an 8051 microcontroller, the lower address byte and data are multiplexed on the same lines. Which hardware component is required to hold the lower address byte temporarily for correct memory access?
Ans	 A. Encoder  B. Multiplexer  C. Subtractor  D. Latch
Q.71	A telecommunications company observes call drops at the borders of adjacent cell sites. Which cell site configuration adjustment would minimize this issue?
Ans	 A. Assigning the same frequency to neighboring cell sites  B. Decreasing the height of all cell site antennas  C. Reducing the transmission power of each cell site  D. Introducing overlapping coverage areas with handover protocols
Q.72	Three identical 12 V batteries are connected in parallel to supply a load current of 18 A. Assuming equal sharing, how much current is supplied by each battery?
Ans	 A. 9 A  B. 4 A  C. 6 A  D. 18 A
Q.73	Which statement correctly distinguishes a primary battery from a secondary battery?
Ans	 A. A primary battery is generally non-rechargeable, while a secondary battery can be recharged and reused  B. A primary battery is used only in automobiles, while a secondary battery is used only in torches  C. A primary battery always has higher voltage than a secondary battery  D. A primary battery can be recharged many times, while a secondary battery cannot be recharged
Q.74	A draftsman needs to construct a precise 75° angle without using a protractor. Which combination of instruments should be used?
Ans	 A. Use two 45° set-squares together against a T-square  B. Use a divider to bisect a 120° angle accurately  C. Use a mini-drafter aligned with a T-square edge  D. Use a 45° set-square with a 30°–60° set-square against a T-square
Q.75	An n-type semiconductor is formed by doping with:
Ans	 A. Pentavalent impurities  B. Divalent impurities  C. Monovalent impurities  D. Trivalent impurities