



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 Wiremen

* 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 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. $\sqrt{107}$ cm
 - ☒ D. $\sqrt{97}$ cm

Q.2 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 180 km per hour since that was the odometer reading at 8:00 am.
 - ☒ B. The car's average speed is 40 km per hour as calculated from the odometer readings and time interval.
 - ☒ C. The car's average speed is 60 km per hour based only on the change in odometer readings.
 - ☒ D. The car's average speed is 240 km per hour since that was the odometer reading at 9:30 am.

Q.3 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. 12,000 joules
 - ☒ B. 24,000 joules
 - ☒ C. 480,000 joules
 - ☒ D. 240,000 joules

Q.4 If 'A' stands for '+', 'B' stands for '-', 'C' stands for 'x' and 'D' stands for '÷', then what will come in place of the question mark (?) in the following equation?

$$28 \text{ A } 16 \text{ C } 3 \text{ B } 12 \text{ D } 4 = ?$$

- Ans
- ☒ A. 73
 - ☒ B. 70
 - ☒ C. 72
 - ☒ D. 71

Q.5 Which approach most effectively reduces both nitrogen and phosphorus concentrations during wastewater treatment?

- Ans**
- ☐ A. Surface-flow constructed wetlands
 - ☐ B. Primary sedimentation with extended aeration
 - ☒ C. Biological and chemical nutrient removal
 - ☐ D. UV disinfection following secondary treatment

Q.6 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. Light energy
 - ☐ D. Potential energy

Q.7 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. 9568
 - ☒ B. 9856
 - ☐ C. 9865
 - ☐ D. 8956

Q.8 What should come in place of the question mark (?) in the given series?

98, 104, 116, 134, 158, ?

- Ans**
- ☐ A. 186
 - ☐ B. 184
 - ☐ C. 190
 - ☒ D. 188

Q.9 Find the LCM of 72, 78, and 90.

- Ans**
- ☐ A. 4250
 - ☐ B. 4120
 - ☐ C. 4280
 - ☒ D. 4680

Q.10 Which of the following best describes a key environmental concern associated with improper disposal of e-waste?

- Ans**
- ☐ A. Increased recycling rates of precious metals
 - ☐ B. Enhanced biodegradation of plastics
 - ☒ C. Release of toxic metals into soil and water
 - ☐ D. Release of greenhouse gases from decomposition

Q.11 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. A
 - ☒ B. C
 - ☐ C. X
 - ☐ D. Z

Q.12 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. 6 days
 - ☒ B. 4 days
 - ☒ C. 5 days
 - ☒ D. 8 days

Q.13 Which of the following scenarios best demonstrates the conversion of chemical energy to mechanical energy?

- Ans**
- ☒ A. A stone falls off a table to the ground
 - ☒ B. A flashlight turns on after inserting new batteries
 - ☒ C. A runner uses stored energy from food to sprint forward
 - ☒ D. A stretched rubber band snaps back to its original shape

Q.14 What is the typical temperature range covered by a laboratory thermometer used in school experiments?

- Ans**
- ☒ A. Zero to two hundred degrees Celsius
 - ☒ B. Thirty five to forty two degrees Celsius
 - ☒ C. Minus fifty to fifty degrees Celsius
 - ☒ D. Minus ten to one hundred and ten degrees Celsius

Q.15 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. 50 J
 - ☒ C. 500 J
 - ☒ D. 0 J

Q.16 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. TSNWW
 - ☒ B. STMWV
 - ☒ C. WSNYT
 - ☒ D. WRNYT

Q.17 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. Both conclusions (I) and (II) follow
 - ☒ B. Neither conclusion (I) nor (II) follows
 - ☒ C. Only conclusion (II) follows
 - ☒ D. Only conclusion (I) follows

Q.18 When using a hand file during fitting operations, which action demonstrates adherence to tool safety protocols?

- Ans**
- ☒ A. Applying excessive downward force when filing
 - ☒ B. Fitting a proper handle securely to the tang
 - ☒ C. Filing above shoulder height for better leverage
 - ☒ D. Holding the file near its tang during filing work

Q.19 A thermometer shows a reading of 37 degrees Celsius. What is the corresponding temperature in Kelvin?

- Ans**
- ☒ A. 320 K
 - ☒ B. 310 K
 - ☒ C. 270 K
 - ☒ D. 300 K

Q.20 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. P
 - ☒ C. R
 - ☒ D. Q

Q.21 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. 4
 - ☒ B. 7
 - ☒ C. 5
 - ☒ D. 6

Q.22 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 remains at 2.5 seconds
 - ☒ B. It has increased to 3.0 seconds
 - ☒ C. It has decreased to 2.0 seconds
 - ☒ D. It has decreased to 1.5 seconds

Q.23 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 the true shape of the intersection using auxiliary projection
 - ☒ C. Draw a simple circle at the junction in the top view
 - ☒ D. Represent the intersection as a straight line in the side view

Q.24 Which line symbol is commonly used in engineering drawings to represent a hidden edge that is not directly visible?

- Ans**
- ☒ A. Chain thin line
 - ☒ B. Dashed line
 - ☒ C. Zigzag line
 - ☒ D. Solid thick line

Q.25 Which feature is a requirement of the BIS drawing standard in engineering drawings?

- Ans**
- ☒ A. Use of colored pencils for clarity
 - ☒ B. Title block with specific information
 - ☒ C. Freehand sketches without scale
 - ☒ D. Margin lines of random width

Q.26 In how many years will a sum of ₹16,000 at 10% per annum compounded semi-annually become ₹18,522?

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

Q.27 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. 6 hours
 - ☒ C. 7.5 hours
 - ☒ D. 10 hours

Q.28 Which is the most important safety check before operating any machine in a workshop?

- Ans**
- ☒ A. Inspect the machine for loose or damaged parts
 - ☒ B. Check if the machine is plugged in properly
 - ☒ C. Wipe the machine with a dry cloth before use
 - ☒ D. Ensure the machine area is properly illuminated

Q.29 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. Data in statement II alone is sufficient to answer the question while data in statement I is not
 - ☒ C. Both statements I and II together are NOT sufficient to answer the question
 - ☒ D. Both statements I and II together (and not statement I alone or statement II alone) are sufficient to answer the question

Q.30 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. 39
 - ☐ B. 53
 - ☐ C. 27
 - ☐ D. 42

Q.31 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.32 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. ₹74,624
 - ☐ B. ₹72,604
 - ☐ C. ₹73,624
 - ☒ D. ₹72,624

Q.33 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. 4 - 16 - 8 - 4
 - ☐ B. 8 - 64 - 32 - 14
 - ☐ C. 5 - 25 - 15 - 7
 - ☐ D. 12 - 144 - 62 - 31

Q.34 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. 26.5% loss
 - ☐ B. 20.9% profit
 - ☐ C. 15.7% profit
 - ☐ D. 22.6% profit

Q.35 Which statement best describes a 'point' in engineering drawing?

- Ans**
- ☐ A. A point is the intersection of two lines and always has measurable length.
 - ☒ B. A point indicates a precise location but has no size, length, or width.
 - ☐ 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.36 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 conservation of energy
 - ✗ B. Law of inertia
 - ✗ C. Principle of inertia
 - ✗ D. Principle of superposition

Q.37 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. Two
 - ✗ D. One

Q.38 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. Focusing only on base diameter for precise fit
 - ✗ C. Matching only the overall height of the cone
 - ✗ D. Prioritizing uniform wall thickness over all other features

Q.39 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. Two
 - ✗ B. One
 - ✗ C. Three
 - ✗ D. Four

Q.40 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.41 What should come in place of the question mark (?) in the given series?

74, 83, 101, 128, ?, 209

- Ans**
- ✓ A. 164
 - ✗ B. 155
 - ✗ C. 176
 - ✗ D. 146

Q.42 Which of the following is both, an input and output device?

- Ans**
- ✗ A. Printer
 - ✗ B. Projector
 - ✓ C. Touchscreen monitor
 - ✗ D. Keyboard

Q.43 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. 20.5
 - ☐ B. 25
 - ☒ C. 24.5
 - ☐ D. 23.5

Q.44 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. 3
 - ☐ C. 0
 - ☐ D. 1

Q.45 Which component makes up the largest proportion of Earth's atmosphere by volume?

- Ans**
- ☐ A. Carbon dioxide
 - ☐ B. Oxygen
 - ☐ C. Argon
 - ☒ D. Nitrogen

Q.46 What is the main purpose of ambient air quality standards?

- Ans**
- ☒ A. To set legally permissible limits for specific pollutants to protect public health.
 - ☐ B. To require all industries to reduce emissions by the exact same percentage.
 - ☐ C. To ensure air is routinely sampled to map historical pollution trends.
 - ☐ D. To focus exclusively on industrial operations while ignoring other sectors.

Q.47 What is an email used for?

- Ans**
- ☐ A. Data processing
 - ☒ B. Sending messages
 - ☐ C. Creating documents
 - ☐ D. File storage

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. 4000 mm
 - ☒ B. 4 m
 - ☐ C. 0.4 m
 - ☐ D. 400 cm

Q.49 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. 13.0%
 - ☐ B. 14.1%
 - ☐ C. 13.7%
 - ☐ D. 12.6%

- Q.50** Which of the following statements correctly describes average velocity and its SI unit?
- Ans**
- ☐ A. Average velocity is the total displacement 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 kilometer per hour.
 - ☐ C. Average velocity is the total distance 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 meter per second.

- Q.51** 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. AF – DI
 - ☒ B. CH – EK
 - ☐ C. BG – EJ
 - ☐ D. DJ – GM

- Q.52** 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. HKVJ
 - ☐ B. IKUH
 - ☐ C. IJVJ
 - ☒ D. HJVI

- Q.53** A runner completes one lap of a 200 meter circular track in 50 seconds. What is the average speed of the runner?

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

- Q.54** In third angle projection, where is the object placed relative to the plane of projection?

- Ans**
- ☐ A. The object is placed in the fourth quadrant
 - ☒ B. The object is placed in the third quadrant
 - ☐ C. The object is placed in the second quadrant
 - ☐ D. The object is placed in the first quadrant

- Q.55** What is the primary function of a fire hydrant in a workplace safety system?

- Ans**
- ☐ A. Detecting smoke and warning employees
 - ☐ B. Activating fire alarms automatically in emergencies
 - ☐ C. Removing hazardous fumes from the area
 - ☒ D. Supplying large quantities of water to fight fires

- Q.56** 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. HIZ 30
 - ☒ B. IGA 25
 - ☐ C. IHS 23
 - ☐ D. JHZ 24

Q.57 If a scooter travels at a constant speed of 25 km per hour, how far will it travel in 4 hours?

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

Q.58 Which property of a fuse wire ensures it melts quickly when excess current flows?

- Ans**
- ☒ A. Low melting point
 - ☐ B. Thick wire
 - ☐ C. High electrical resistance
 - ☐ D. High melting point

Q.59 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. EY-KO
 - ☒ C. QK-VA
 - ☐ D. WQ-CG

Q.60 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. Mother's mother
 - ☐ B. Son's wife
 - ☒ C. Son's wife's mother
 - ☐ D. Son's wife's sister

Q.61 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 20 K.
 - ☐ B. The temperature change is 15 K.
 - ☐ C. The temperature change is 50 K.
 - ☐ D. The temperature change is 30 K.

Q.62 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. The outline of triangular prism and circular hole will be visible in front view only
 - ☒ B. The outline of rectangular base and triangular prism will be visible but hole is not shown
 - ☐ C. Only the rectangular base outline will be visible in the front view drawing
 - ☐ D. Only the triangular prism will be clearly visible in the front view drawing

Q.63 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 less on the Moon than on Earth
 - ☐ B. The object weighs more on the Moon than on Earth
 - ☐ C. The object weighs the same on both the Moon and Earth
 - ☐ D. The object weighs zero on the Moon

Q.64 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. None
 - ☒ B. Four
 - ☒ C. Three
 - ☒ D. Two

Q.65 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. 7.5 meters per second
 - ☒ B. 8.0 meters per second
 - ☒ C. 7.0 meters per second
 - ☒ D. 6.5 meters per second

Q.66 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. ₹5,000
 - ☒ B. ₹8,000
 - ☒ C. ₹9,000
 - ☒ D. ₹6,000

Q.67 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. XDE : PON
 - ☒ B. FMT : IQY
 - ☒ C. VCD : GRD
 - ☒ D. CGW : NHT

Q.68 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. 6.55 hours
 - ☒ B. 5.56 hours
 - ☒ C. 9.45 hours
 - ☒ D. 3.33 hours

Q.69 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 becoming entangled in a rotating machine shaft during operation
 - ☒ B. A hand sliding repeatedly across a rough abrasive machine surface during work
 - ☒ C. A hand touching a hot metallic machine surface during maintenance activity
 - ☒ D. A hand caught between a moving blade and a fixed machine surface during operation

Q.70 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. 98
 - ☐ B. 93
 - ☒ C. 82
 - ☐ D. 99

Q.71 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. S
 - ☐ B. R
 - ☐ C. Q
 - ☒ D. P

Q.72 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 cm^3) of the cylinder?

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

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

Q.73 If 'A' stands for '+', 'B' stands for '-', 'C' stands for 'x' and 'D' stands for ' $\div$ ', then what will come in place of the question mark (?) in the following equation?

$31 \text{ B } 35 \text{ D } 7 \text{ A } 9 \text{ C } 2 = ?$

- Ans
- ☒ A. 44
 - ☐ B. 42
 - ☐ C. 48
 - ☐ D. 46

Q.74 If $\left(x + \frac{1}{x} \right) = 3$, find the value of $\left(x^3 + \frac{1}{x^3} \right)$.

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

Q.75 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. 2
 - ☒ B. 9
 - ☐ C. 4
 - ☐ D. 7

Q.76 What do touch gestures in Microsoft Windows allow users to do?

- Ans**
- ☐ A. Connect external devices
 - ☐ B. Type faster on the keyboard
 - ☒ C. Perform actions using finger movements
 - ☐ D. Increase screen brightness

Q.77 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. ₹1,260
 - ☐ B. ₹1,380
 - ☐ C. ₹1,200
 - ☒ D. ₹1,440

Q.78 Which of the following statements correctly reflects the characteristics of a Local Area Network (LAN) and the role of Ethernet within it?

- Ans**
- ☒ A. Ethernet is a standard that governs how devices in a LAN communicate via wired connections, supporting speeds from 10 Mbps to 1000 Mbps.
 - ☐ B. A LAN always requires Gigabit Ethernet to function and is insecure because it allows open access to all network devices.
 - ☐ C. LANs are designed for long-distance communication and use Ethernet primarily for wireless data exchange.
 - ☐ D. Ethernet in a LAN provides low-speed data transfer and connects users over public Internet infrastructure.

Q.79 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. Project all visible elements from the side and omit hidden features unless needed
 - ☐ B. Use only hidden lines for representing features on the far side in the view
 - ☐ C. Sketch the side view freely without using projections from the main view
 - ☐ D. Include all features even those not visible from the selected side view

Q.80 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 are NOT sufficient to answer the question.
 - ☐ C. Both statements I and II together (and not statement I alone or statement II alone) are 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.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. NBQ
 - ☐ B. PDP
 - ☒ C. OCP
 - ☐ D. NDO

Q.82 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 moved to the new worksheet.
 - ☐ C. The selected cells are saved to a new file.
 - ☒ D. The selected cells are copied to the new worksheet.

Q.83 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. ₹12,000
 - ☐ C. ₹10,000
 - ☐ D. ₹9,000

Q.84 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. 30 km/h east
 - ☐ C. 50 km/h north
 - ☐ D. 40 km/h east

Q.85 The average of 8 numbers is 45. If one number, 59, is removed, what will the new average be?

- Ans**
- ☐ A. 41.5
 - ☐ B. 42
 - ☐ C. 42.5
 - ☒ D. 43

Q.86 Solve the system of equations:

$$-3x + 2y - z = -1, 6x - 6y + 7z = -7, 3x - 4y + 4z = -6$$

- Ans**
- ☐ A. $x=2, y=1, z=-3$
 - ☐ B. $x=1, y=2, z=2$
 - ☒ C. $x=2, y=2, z=-1$
 - ☐ D. $x=-2, y=2, z=11$

Q.87 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. Father's mother
 - ☐ B. Father's sister
 - ☒ C. Mother's mother
 - ☐ D. Mother's sister

Q.88 Simplify: $60 - \{(-8) \times (-16 - 19 - 2)\} \div [5 \times \{2 + (-1) \times (-1)\}]$

- Ans**
- ☐ A. $\frac{608}{15}$
 - ☒ B. $\frac{604}{15}$
 - ☐ C. $\frac{594}{15}$
 - ☐ D. $\frac{614}{15}$

Q.89 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. 48 kg
 - ☒ B. 50 kg
 - ☒ C. 52 kg
 - ☒ D. 45 kg

Q.90 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. Validate the analysis using workplace data
 - ☒ B. List all possible causes of failures
 - ☒ C. Define the top event representing the injury
 - ☒ D. Establish preventive measures to control risks

Q.91 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. V
 - ☒ B. S
 - ☒ C. P
 - ☒ D. Q

Q.92 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?

$$14 \text{ A } 30 \text{ B } 45 \text{ C } 15 \text{ D } 9 = ?$$

- Ans**
- ☒ A. 27
 - ☒ B. 28
 - ☒ C. 29
 - ☒ D. 25

Q.93 Which of the following best defines 'work' in physics?

- Ans**
- ☒ A. Work is done when energy is stored in an object.
 - ☒ B. Work is done if a force acts at any angle to the motion.
 - ☒ C. Work is done when a force moves an object in the direction of the force.
 - ☒ D. Work is done whenever a force is applied, regardless of movement.

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. 0 km/h
 - ☒ B. 33.3 km/h north
 - ☒ C. 20 km/h south
 - ☒ D. 6.7 km/h north

Q.95 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. North-West
 - ☐ B. North-East
 - ☐ C. South-East
 - ☐ D. South-West

Q.96 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. 729
 - ☒ C. 84
 - ☐ D. 732

Q.97 Which situation best describes an entanglement hazard in a mechanical workshop?

- Ans**
- ☒ A. Loose clothing caught in a rotating shaft
 - ☐ B. Finger cut by a sharp edge
 - ☐ C. Gloves worn near hot surfaces
 - ☐ D. Hand pinched between gears

Q.98 Which integrated strategy best addresses soil pollution, falling crop yields, and low microbial activity near an industrial zone?

- Ans**
- ☒ A. Control industrial waste for sustainability.
 - ☐ B. Expand urban areas into farmland.
 - ☐ C. Ban all regional chemical fertilizers.
 - ☐ D. Reforestation in nearby urban centers.

Q.99 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. 45.3 km/h
 - ☐ B. 45.8 km/h
 - ☒ C. 48.6 km/h
 - ☐ D. 46.5 km/h

Q.100 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

Section : PART-B

Q.1 In a climate-controlled laboratory where aesthetics and minimal electromagnetic interference are priorities, which wiring system is most appropriate?

- Ans
- ☐ A. Cleat wiring with ceramic cleats
 - ☐ B. Batten wiring with wooden battens
 - ☐ C. Casing-capping wiring with plastic covers
 - ☒ D. Concealed conduit wiring with non-magnetic pipes

Q.2 A factory is being constructed in an area with frequent electrical storms. The engineers must design an earthing system. Which factor is critical to prioritize in their design to ensure safety and equipment protection?

- Ans
- ☐ A. Using a single GI pipe for earthing
 - ☐ B. Using the thickest possible earthing cable
 - ☒ C. Increasing the number of earthing rods
 - ☐ D. Placing earthing rods close together

Q.3 Why is the control circuit typically wired separately from the power circuit in electrical schematic drawings?

- Ans
- ☒ A. To facilitate easy maintenance and identification
 - ☐ B. To reduce the cost of conductors
 - ☐ C. To increase the current carrying capacity
 - ☐ D. To combine power and control circuits

Q.4 A three-phase synchronous motor is connected to an AC supply. If the field excitation is decreased below the value required for unity power factor operation, what is the expected effect on the motor power factor?

- Ans
- ☐ A. The motor power factor becomes zero
 - ☒ B. The power factor becomes lagging
 - ☐ C. The power factor becomes leading
 - ☐ D. The power factor remains unity

Q.5 Which symbol is used in engineering drawing to show a spot face?

- Ans
- ☐ A. A small circle with an internal cross
 - ☐ B. A circle with a horizontal line under it
 - ☐ C. A plain rectangle with no center marks
 - ☒ D. A plain circle with no internal marks

Q.6 Select the relay type that compares currents at two points to detect faults within a protected zone.

- Ans**
- ☐ A. Inverse time overcurrent relay
 - ☐ B. Distance relay
 - ☒ C. Differential relay
 - ☐ D. Instantaneous overcurrent relay

Q.7 A DC shunt motor is running at full load. Which action will increase its speed beyond its rated value?

- Ans**
- ☐ A. Decreasing supply voltage
 - ☐ B. Increasing load on the motor
 - ☐ C. Increasing armature resistance
 - ☒ D. Decreasing field winding current

Q.8 If the current in a coil lags the voltage by 60° , what is the circuit's power factor?

- Ans**
- ☐ A. $\frac{\sqrt{3}}{2}$ leading
 - ☐ B. $\frac{\sqrt{3}}{2}$ lagging
 - ☐ C. 0.5 leading
 - ☒ D. 0.5 lagging

Q.9 Why is Relay Ladder Logic (RLL) represented in a graphical form similar to relay control circuits in programmable logic controllers (PLCs)?

- Ans**
- ☐ A. To reduce the operating voltage required by PLC hardware
 - ☐ B. To replace all electrical wiring connections inside industrial machines
 - ☐ C. To increase the memory capacity of programmable logic controllers
 - ☒ D. To make PLC programming easier for technicians familiar with relay logic troubleshooting

Q.10 Which of the following methods is used to detect an oil leak in an underground oil filled cable joint without excavation?

- Ans**
- ☐ A. Use a thermal imaging camera
 - ☐ B. Listen for unusual cable sounds
 - ☐ C. Visually inspect the joint enclosure
 - ☒ D. Monitor pressure drop in the oil system

Q.11 If three light bulbs are connected in a series circuit and one bulb burns out (opens), what happens to the remaining bulbs?

- Ans**
- ☐ A. The other bulbs continue glowing normally
 - ☐ B. The other bulbs glow dimmer
 - ☒ C. The other bulbs stop glowing
 - ☐ D. The other bulbs glow brighter

Q.12 Which component in a wiring diagram is specifically used to protect against overcurrent?

- Ans**
- ☐ A. Pushbutton symbol
 - ☐ B. Lamp symbol
 - ☐ C. Relay symbol
 - ☒ D. Fuse symbol

Q.13 What is the purpose of the Cable Sheath Continuity Test in underground cables?

- Ans**
- ☐ A. To determine the total cable length
 - ☐ B. To check the cable conductor resistance
 - ☒ C. To check if the metallic sheath or armor is continuous
 - ☐ D. To measure the cable insulation resistance

Q.14 A voltmeter is connected across an open switch in a DC circuit. One side of the switch is connected to the supply voltage, while the other side is connected to the opposite terminal of the supply through a load. Assuming an ideal voltmeter and no current flow, what voltage will the meter read?

- Ans**
- ☐ A. The voltmeter will read half the supply voltage
 - ☐ B. The voltmeter will show a fluctuating value
 - ☐ C. The voltmeter will read zero volts
 - ☒ D. The voltmeter will read the full supply voltage

Q.15 A technician needs to select a wire for connecting a 230V control circuit inside a panel. Which specification is most important for this application?

- Ans**
- ☒ A. Voltage rating and insulation quality
 - ☐ B. Current carrying capacity alone
 - ☐ C. Color code for identification
 - ☐ D. Flexibility for ease of routing

Q.16 In which situation is DC transmission preferred over AC transmission in power networks?

- Ans**
- ☐ A. For rural short transmission lines
 - ☐ B. For local substation connections
 - ☒ C. For very long-distance underwater cables
 - ☐ D. For distribution in city networks

Q.17 During the open circuit test, transformer core loss depends on _____.

- Ans**
- ☐ A. Winding resistance only
 - ☐ B. Secondary load current
 - ☐ C. Leakage reactance
 - ☒ D. Maximum core flux density

Q.18 A universal motor is brought into the workshop with the complaint of excessive sparking at the commutator under load. Which is the most likely cause to check first?

- Ans**
- ☐ A. Faulty armature windings
 - ☐ B. Shorted commutator bar
 - ☒ C. Worn out carbon brushes
 - ☐ D. Damaged field winding

Q.19 Which generator type is least suitable for constant voltage applications?

- Ans**
- ☐ A. Shunt DC Generator
 - ☐ B. Compound DC Generator
 - ☐ C. Separately Excited DC Generator
 - ☒ D. Series DC Generator

Q.20 While repairing overhead transmission lines, which type of wire joint is most suitable for joining two stranded conductors with high current carrying requirements?

- Ans**
- ☒ A. Western Union joint
 - ☒ B. Married joint
 - ☒ C. Britannia joint
 - ☒ D. Knotted tap joint

Q.21 Which type of lamp is suitable for street lighting due to its high efficiency and long life?

- Ans**
- ☒ A. Sodium vapor lamp
 - ☒ B. Incandescent lamp
 - ☒ C. Fluorescent lamp
 - ☒ D. Mercury vapor lamp

Q.22 If the resistance of an earth electrode is measured to be 6 ohms, what should be done according to IEE regulations?

- Ans**
- ☒ A. Leave the installation as it is
 - ☒ B. Use a thinner earth wire
 - ☒ C. Improve the earthing by adding more rods or pouring water
 - ☒ D. Increase the supply voltage to the circuit

Q.23 A technician receives a residential electrical installation plan and must prepare a material and cost estimate for both lighting and heating circuits. Which process should be followed according to standard electrical estimation practice?

- Ans**
- ☒ A. Prepare a single combined material list and estimate the total cost together.
 - ☒ B. Exclude minor accessories from the estimate to simplify cost calculation.
 - ☒ C. Prepare separate material lists and calculate the total cost for each circuit individually.
 - ☒ D. Estimate costs using approximate quantities for commonly used materials only.

Q.24 Which wiring system is technically unsuitable for permanent commercial electrical installations due to its temporary mechanical support arrangement and low durability?

- Ans**
- ☒ A. Casing and capping wiring system
 - ☒ B. Cleat wiring system
 - ☒ C. Conduit wiring system
 - ☒ D. Trunking wiring system

Q.25 Which safety feature in domestic appliances helps prevent electric shock by providing a path for leakage current to the ground?

- Ans**
- ☒ A. Insulation
 - ☒ B. Earthing connection
 - ☒ C. Fuse
 - ☒ D. Neutral wire

Q.26 Which of the following parameters must be tested according to quality standards before commissioning a solar power plant?

- Ans**
- ☒ A. Insulation resistance measurement
 - ☒ B. Grid voltage setting
 - ☒ C. Cable color coding
 - ☒ D. Module cleaning schedule

Q.27 If copper wire is replaced with aluminum wire in a joint, which electrical property is most significantly affected?

- Ans**
- ☒ A. Insulation strength of the conductor
 - ☒ B. Electrical resistance of the joint
 - ☒ C. Magnetic susceptibility of the joint
 - ☒ D. Magnetic permeability of the wire

Q.28 A thread gauge is best suited for which of the following tasks in an ITI fitting shop?

- Ans**
- ☒ A. Measuring the diameter of a rod
 - ☒ B. Tightening the nut of a bolt
 - ☒ C. Cleaning the debris off a thread
 - ☒ D. Checking the pitch of a thread

Q.29 An electrician is planning the wiring for a two-room house. Each room requires one ceiling light and two socket outlets. Which of the following wiring layouts provides the most efficient use of wire while maintaining safety?

- Ans**
- ☒ A. Using a ring circuit for sockets and a radial circuit for lights
 - ☒ B. Using two separate ring circuits for each room
 - ☒ C. Using a single radial circuit for all loads
 - ☒ D. Combining sockets and lights on one ring circuit

Q.30 Why is hazard communication critical in construction environments?

- Ans**
- ☒ A. It removes all potential hazards from the construction site
 - ☒ B. It helps workers understand hazards and safety precautions
 - ☒ C. It allows workers to perform tasks without protective equipment
 - ☒ D. It focuses mainly on reporting workplace accidents and incidents

Q.31 Which type of centrally monitored fire detection and alarm system is used in large commercial public buildings for fire safety?

- Ans**
- ☒ A. Manual fire alarm call point system only
 - ☒ B. Conventional heat detector alarm system
 - ☒ C. Standalone residential smoke detector units
 - ☒ D. Addressable fire detection and alarm system

Q.32 Which property of a resistor determines how much it opposes the flow of electric current in a DC circuit?

- Ans**
- ☒ A. Physical size
 - ☒ B. Power rating
 - ☒ C. Resistance value
 - ☒ D. Color code

Q.33 Before measuring current with an analog multimeter, how should the meter be connected in a circuit?

- Ans**
- ☒ A. In parallel with the load
 - ☒ B. Across the power supply
 - ☒ C. In series with the load
 - ☒ D. To earth ground

Q.34 A control panel design requires cable markers to be both flame-retardant and resistant to abrasion. Which material is best suited for this requirement?

- Ans**
- ☐ A. Clip-on plastic tags
 - ☐ B. Vinyl electrical tapes
 - ☒ C. Polyolefin heat-shrink sleeves
 - ☐ D. Self-adhesive paper labels

Q.35 The property of a material by which it regains its original shape and size after removal of the deforming force is called:

- Ans**
- ☐ A. Plasticity
 - ☒ B. Elasticity
 - ☐ C. Hardness
 - ☐ D. Brittleness

Q.36 Choose the correct sequence for erecting an overhead transmission line.

1. Foundation work
2. Tower erection
3. Conductor stringing
4. Insulator installation

- Ans**
- ☐ A. Foundation work, Conductor stringing, Tower erection, Insulator installation
 - ☐ B. Insulator installation, Foundation work, Tower erection, Conductor stringing
 - ☒ C. Foundation work, Tower erection, Insulator installation, Conductor stringing
 - ☐ D. Tower erection, Foundation work, Conductor stringing, Insulator installation

Q.37 What is a primary advantage of the Bureau of Indian Standards (BIS) codification system for steels?

- Ans**
- ☒ A. It relates steel grades to important material properties
 - ☐ B. It provides information limited to historical steel records
 - ☐ C. It relies mainly on visual methods for steel identification
 - ☐ D. It is accepted uniformly by every country worldwide

Q.38 Which of the following equipment provides surge protection in substations?

- Ans**
- ☐ A. Line isolator
 - ☒ B. Lightning arrester
 - ☐ C. Main busbar
 - ☐ D. Overcurrent relay

Q.39 While planning lighting for a machine assembly area, an engineer calculates the required number of luminaires. If the area is 60 square meters and the recommended illumination level is 300 lux, what is the total luminous flux required for the area?

- Ans**
- ☐ A. 9000 lumens
 - ☐ B. 21000 lumens
 - ☐ C. 12000 lumens
 - ☒ D. 18000 lumens

Q.40 In a series DC circuit, what happens if one component fails or becomes open-circuit?

- Ans**
- ☐ A. Current flows in reverse direction
 - ☐ B. Current bypasses the failed component
 - ☒ C. The entire circuit stops working
 - ☐ D. Current flows only through working components

Q.41 While selecting an institute for training a licensed wireman, which factor should be prioritized to ensure eligibility for the wireman permit?

- Ans**
- ☐ A. Choosing the shortest training program available
 - ☐ B. Selecting the institute closest to home
 - ☐ C. Opting for the lowest tuition fee
 - ☒ D. Selecting an accredited institute recognized by the government authority

Q.42 Which step is most crucial for enabling the collection of electric current in a silicon-based solar cell?

- Ans**
- ☐ A. Sandwiching doped and undoped wafers
 - ☒ B. Attaching metallic strips to the extreme layers
 - ☐ C. Doping wafers with impurities
 - ☐ D. Cutting silicon into thin wafers

Q.43 Which of the following is NOT a characteristic of a block diagram?

- Ans**
- ☐ A. It utilizes simple geometric blocks to represent individual critical subsystems
 - ☐ B. It highlights the functional relationships between the main system components
 - ☒ C. It includes the detailed internal construction details of individual components
 - ☐ D. It displays the overall system functions without showing complex connection paths

Q.44 What does the BIS code 2330 primarily indicate?

- Ans**
- ☒ A. It indicates a nickel steel with high nickel content
 - ☐ B. It identifies a free cutting steel grade type
 - ☐ C. It denotes a chromium steel used in engineering
 - ☐ D. It represents a plain carbon steel grade material

Q.45 What is the function of the charging controller in an AC charging system for electric vehicles?

- Ans**
- ☐ A. To select the type of charging cable used
 - ☐ B. To provide direct power to the vehicle's motor
 - ☒ C. To manage charging communication of vehicles
 - ☐ D. To control the speed of the electric vehicle

Q.46 Solar cells are also known as the building blocks of which devices?

- Ans**
- ☐ A. Batteries
 - ☒ B. Photovoltaic modules
 - ☐ C. Transformers
 - ☐ D. Electrical wires

Q.47 Which statement best describes an isolating switch?

- Ans**
- ☐ A. It is a remote-controlled hydraulic switch
 - ☐ B. It is a programmable digital switch
 - ☐ C. It is an automatic electronic switch
 - ☒ D. It is a manually operated mechanical switch

Q.48 Which condition must be met for a DC shunt generator to successfully charge a battery bank?

- Ans**
- ☐ A. The armature resistance must be maximum.
 - ☐ B. The generator terminal voltage must be equal to the battery voltage.
 - ☒ C. The generator terminal voltage must be higher than the battery voltage.
 - ☐ D. The generator field resistance must be minimum.

Q.49 Which of the following scenarios demonstrates a real-life consequence of ignoring longitude effects in solar power plant design?

- Ans**
- ☐ A. Solar panels use unsuitable materials for region
 - ☐ B. Solar panels are installed at incorrect latitude
 - ☐ C. Solar panels neglect weather monitoring input
 - ☒ D. Solar panels receive suboptimal sunlight due to misaligned tracking schedules

Q.50 Find the circumference of a circle having radius 7 cm. Use $\pi=22/7$.

- Ans**
- ☐ A. 66 cm
 - ☐ B. 88 cm
 - ☐ C. 22 cm
 - ☒ D. 44 cm

Q.51 According to the laws of electrolysis, what happens to the mass of substance deposited at an electrode if the quantity of electricity passed through the electrolyte is increased?

- Ans**
- ☒ A. The mass deposited increases
 - ☐ B. The mass deposited changes unpredictably
 - ☐ C. The mass deposited remains constant
 - ☐ D. The mass deposited decreases

Q.52 What does it mean when the galvanometer in a Wheatstone bridge shows zero deflection?

- Ans**
- ☒ A. The bridge has reached a balanced condition
 - ☐ B. The power supply is disconnected completely
 - ☐ C. Exactly three out of four resistances are identical
 - ☐ D. The bridge contains a short-circuited path

Q.53 An industrial electrician uses an insulation resistance tester on a three-core cable. The measured resistance between core and earth is 900 megaohms. What does this value indicate about the cable's insulation condition?

- Ans**
- ☐ A. The cable has severe moisture ingress and needs drying.
 - ☐ B. The insulation has broken down and needs immediate replacement.
 - ☒ C. The insulation is in good condition and safe for operation.
 - ☐ D. The cable is unsuitable for industrial environments due to low strength.

Q.54 For fitting operations on thin sheet metal, which cutting tool offers the best control and precision?

- Ans**
- ☐ A. Flat hand file
 - ☐ B. Cold chisel
 - ☒ C. Hand snips
 - ☐ D. Standard hacksaw

Q.55 Which type of substation would be strategically installed on a high-voltage transmission line to improve network reliability by isolating faults without changing voltage levels?

- Ans**
- ☐ A. Step-up transformer substation
 - ☐ B. Traction substation
 - ☐ C. Step-down transformer substation
 - ☒ D. Switching substation

Q.56 In an industrial wiring project, you must select an enclosure for outdoor use exposed to rain. Which IP code meets this requirement most appropriately?

- Ans**
- ☒ A. IP30
 - ☒ B. IP55
 - ☒ C. IP20
 - ☒ D. IP41

Q.57 Which component in a lead acid cell is specifically made by repeated charging and discharging?

- Ans**
- ☒ A. Electrolyte
 - ☒ B. Container
 - ☒ C. Separators
 - ☒ D. Plante plates

Q.58 A domestic MCCB is marked 25A, 6 kA, 230V AC. Which fault current will this MCCB safely interrupt?

- Ans**
- ☒ A. Any current at 230 V AC
 - ☒ B. Any fault current up to 6,000 A
 - ☒ C. Any overload up to 25 A
 - ☒ D. Any short-circuit above 25A

Q.59 In a Delta-star connected three-phase transformer, the phase shift between primary and secondary voltages is _____.

- Ans**
- ☒ A. 0°
 - ☒ B. 60°
 - ☒ C. 90°
 - ☒ D. 30°

Q.60 If a lighting circuit is designed for 230 V supply and one lamp is rated for 110 V, what will happen if the lamp is connected directly in parallel with other 230 V lamps?

- Ans**
- ☒ A. The 110 V lamp will operate at normal brightness
 - ☒ B. The 110 V lamp will be operate much brighter than others and continue to do so.
 - ☒ C. The 110 V lamp will be dimmer than others
 - ☒ D. The 110 V lamp will fail quickly due to overvoltage

Q.61 If an ELCB in a domestic installation trips occasionally without any apparent fault, what could be a probable reason?

- Ans**
- ☒ A. Small leakage currents from cumulative appliance insulation deterioration
 - ☒ B. Phase and neutral lines are reversed
 - ☒ C. Sudden voltage surges from the supply
 - ☒ D. Increase in total load beyond ELCB rating

Q.62 The price of a tool increased from ₹400 to ₹500. Calculate the percentage increase based on the original price.

- Ans**
- ☒ A. 20%
 - ☒ B. 30%
 - ☒ C. 25%
 - ☒ D. 35%

Q.63 An industrial PLC control panel requires compliance with electromagnetic compatibility (EMC) standards. Which design change best enhances EMC performance?

- Ans**
- ☒ A. Installing metallic cable glands and proper grounding for all entry cables
 - ☐ B. Increasing the insulation grade of all panel cables
 - ☐ C. Minimizing the variation in cable insulation color
 - ☐ D. Using plastic cable glands for all wiring entries

Q.64 When an electric vehicle is connected to a charging station, which process ensures that only authorized users can access charging services securely and efficiently?

- Ans**
- ☐ A. Collecting charging-related data through EVSE–CMS
 - ☐ B. Managing billing information through EVSE–CMS
 - ☐ C. Grid monitoring through EVSE–CMS
 - ☒ D. User authorization through EVSE–CMS

Q.65 Choose the correct sequence of steps needed when calculating the inclination angle for a solar power plant installation.

- Ans**
- ☒ A. Determine latitude, assess shading, account for seasonal changes, set panel angle
 - ☐ B. Set panel angle, determine latitude, account for seasonal changes, assess shading
 - ☐ C. Account for seasonal changes, set panel angle, assess shading, determine latitude
 - ☐ D. Assess shading, set panel angle, determine latitude, account for seasonal changes

Q.66 Why are external resistances connected to the rotor circuit of a slip ring induction motor during starting?

- Ans**
- ☐ A. To proportionally reduce the stator frequency
 - ☐ B. To completely eliminate the iron core losses
 - ☒ C. To significantly increase the starting torque
 - ☐ D. To intentionally decrease the supply voltage

Q.67 What is the purpose of using symbolic representation in engineering drawing?

- Ans**
- ☒ A. To communicate information using standardized symbols
 - ☐ B. To introduce unnecessary complexity into drawings
 - ☐ C. To decorate drawings using additional geometric shapes
 - ☐ D. To improve the decorative appearance of drawings

Q.68 In context to a cumulatively compounded DC generator, which one statement stated below defines the purpose of the series field winding?

- Ans**
- ☐ A. It provides the initial residual magnetism required to start the voltage buildup process.
 - ☐ B. It converts the alternating current induced in the armature into direct current at the terminals.
 - ☐ C. It reduces the mechanical friction of the rotor shaft during high-speed operation.
 - ☒ D. It compensates for internal voltage drops by increasing the magnetic flux as the load current increases.

Q.69 Which device is commonly used as a source of electromotive force in a simple electric circuit?

- Ans**
- ☐ A. Incandescent lamp
 - ☐ B. Electric motor
 - ☐ C. Fixed resistor
 - ☒ D. Electric battery

Q.70 If a universal motor runs smoothly at low speed but emits a high-pitched noise at high speed, what is the probable cause?

- Ans**
- ☒ A. Incorrect brush angle
 - ☐ B. Open field winding
 - ☐ C. Loose lamination stack
 - ☐ D. Faulty centrifugal switch

Q.71 Why is it important to estimate the voltage drop when determining cable size in industrial installations?

- Ans**
- ☐ A. To select the insulation color
 - ☐ B. To reduce installation cost only
 - ☐ C. To determine maximum current rating
 - ☒ D. To ensure equipment receives sufficient voltage

Q.72 In a delta-connected three-phase system, what is the relationship between line voltage and phase voltage?

- Ans**
- ☐ A. Line voltage is zero
 - ☐ B. Line voltage is twice phase voltage
 - ☐ C. Line voltage is less than phase voltage
 - ☒ D. Line voltage equals phase voltage

Q.73 A theater lighting designer must ensure that each part of the stage receives the same amount of illumination from overhead lights. If the distance between the lights and the stage is doubled, which action will maintain equal illumination across all areas, according to the laws of illumination?

- Ans**
- ☐ A. Increase the angle of incidence of the lights
 - ☒ B. Increase the luminous intensity of each light source by a factor of four
 - ☐ C. Double the luminous intensity of each light source
 - ☐ D. Use half the number of lights but keep the same intensity

Q.74 Which part of a twist drill removes chips from the hole during drilling?

- Ans**
- ☒ A. The flutes
 - ☐ B. The shank
 - ☐ C. The point
 - ☐ D. The web

Q.75 What role do designated storage areas play in factory safety and cleanliness?

- Ans**
- ☒ A. They help prevent clutter and maintain workplace order
 - ☐ B. They monitor employee tasks and work performance
 - ☐ C. They improve the speed of machine operations daily
 - ☐ D. They reduce the need for routine cleaning activities