



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 Heat Engine

* 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 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. 9865

B. 9568

C. 8956

D. 9856

Q.2 When a moving car suddenly applies brakes, its kinetic energy is transformed mainly into which form of energy?

- Ans
- A. Heat energy

B. Potential energy

C. Light energy

D. Sound energy

Q.3 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. R

B. S

C. P

D. Q

Q.4 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. Principle of superposition

B. Law of inertia

C. Law of conservation of energy

D. Principle of inertia

Q.5 What is the typical temperature range covered by a laboratory thermometer used in school experiments?

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

Q.6 What is the primary function of a fire hydrant in a workplace safety system?

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

Q.7 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?

31 B 35 D 7 A 9 C 2 = ?

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

Q.8 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. STMVV
 - B. WSNYT
 - C. TSNWW
 - D. WRNYT

Q.9 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. 8 - 64 - 32 - 14
 - B. 5 - 25 - 15 - 7
 - C. 4 - 16 - 8 - 4
 - D. 12 - 144 - 62 - 31

Q.10	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. Prioritizing uniform wall thickness over all other features B. Ensuring the slant height matches the assembly requirement C. Focusing only on base diameter for precise fit D. Matching only the overall height of the cone
Q.11	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 runner uses stored energy from food to sprint forward C. A stretched rubber band snaps back to its original shape D. A flashlight turns on after inserting new batteries
Q.12	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. Both statements I and II together (and not statement I alone or statement II alone) are sufficient to answer the question B. Data in statement II alone is sufficient to answer the question while data in statement I is not C. Data in statement I alone is sufficient to answer the question while data in statement II is not D. Both statements I and II together are NOT sufficient to answer the question
Q.13	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 caught between a moving blade and a fixed machine surface during operation 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 touching a hot metallic machine surface during maintenance activity
Q.14	A thermometer shows a reading of 37 degrees Celsius. What is the corresponding temperature in Kelvin?
Ans	A. 310 K B. 320 K C. 300 K D. 270 K
Q.15	What is the main purpose of ambient air quality standards?
Ans	A. To require all industries to reduce emissions by the exact same percentage. B. To focus exclusively on industrial operations while ignoring other sectors. C. To ensure air is routinely sampled to map historical pollution trends. D. To set legally permissible limits for specific pollutants to protect public health.
Q.16	What is the best description of the purpose of multi-view drawing in engineering drawing?
Ans	A. To represent different sides of an object clearly on a flat surface B. To show different colors of an object for better visual appearance C. To view an object from only one direction D. To present the object in a single three-dimensional visual form only

Q.17	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. 400 cm B. 4 m C. 0.4 m D. 4000 mm
Q.18	If a scooter travels at a constant speed of 25 km per hour, how far will it travel in 4 hours?
Ans	A. 100 km B. 120 km C. 75 km D. 80 km
Q.19	Which statement best describes a 'point' in engineering drawing?
Ans	A. A point is a short line segment used to mark measurements. B. A point is the intersection of two lines and always has measurable length. C. A point represents a small area with both length and width. D. A point indicates a precise location but has no size, length, or width.
Q.20	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. Applying excessive downward force when filing D. Holding the file near its tang during filing work
Q.21	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. 0 B. $\cos A + \sin A$ C. 1 D. $\sin A - \cos A$
Q.22	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. IHS 23 B. IGA 25 C. HIZ 30 D. JHZ 24
Q.23	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. Two C. One D. Four

Q.24	Which is the most important safety check before operating any machine in a workshop?
Ans	A. Check if the machine is plugged in properly B. Ensure the machine area is properly illuminated C. Inspect the machine for loose or damaged parts D. Wipe the machine with a dry cloth before use
Q.25	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
Q.26	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 B. Mother's mother C. Son's wife's mother D. Son's wife's sister
Q.27	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.28	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. ₹74,624 C. ₹73,624 D. ₹72,624
Q.29	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. 0 J B. 500 J C. 1000 J D. 50 J
Q.30	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. $x=2, y=2, z=-1$ C. $x=-2, y=2, z=11$ D. $x=1, y=2, z=2$

Q.31	Which of the following is both, an input and output device?
Ans	A. Keyboard B. Printer C. Touchscreen monitor D. Projector
Q.32	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. Represent the intersection as a straight line in the side view B. Use only standard orthographic projection without auxiliary views C. Draw the true shape of the intersection using auxiliary projection D. Draw a simple circle at the junction in the top view
Q.33	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.34	If $\left(x + \frac{1}{x}\right) = 3$, find the value of $\left(x^3 + \frac{1}{x^3}\right)$.
Ans	A. 20 B. 15 C. 18 D. 16
Q.35	What should come in place of the question mark (?) in the given series? 74, 83, 101, 128, ?, 209
Ans	A. 155 B. 146 C. 164 D. 176
Q.36	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. CGW : NHT B. XDE : PON C. VCD : GRD D. FMT : IQY

Q.37	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. 92550 B. 92500 C. 92400 D. 92450
Q.38	Find the LCM of 72, 78, and 90.
Ans	A. 4250 B. 4680 C. 4120 D. 4280
Q.39	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. Neither conclusion (I) nor (II) follows B. Both conclusions (I) and (II) follow C. Only conclusion (II) follows D. Only conclusion (I) follows
Q.40	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. Control industrial waste for sustainability. C. Expand urban areas into farmland. D. Ban all regional chemical fertilizers.
Q.41	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 moved to the new worksheet. B. The selected cells are copied to the new worksheet. C. The selected cells are deleted from the original worksheet. D. The selected cells are saved to a new file.
Q.42	Which approach most effectively reduces both nitrogen and phosphorus concentrations during wastewater treatment?
Ans	A. UV disinfection following secondary treatment B. Biological and chemical nutrient removal C. Surface-flow constructed wetlands D. Primary sedimentation with extended aeration

Q.43 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. Two B. None C. Three D. Four
Q.44 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.45 Which of the following best defines 'work' in physics? Ans A. Work is done when a force moves an object in the direction of the force. B. Work is done when energy is stored in an object. C. Work is done whenever a force is applied, regardless of movement. D. Work is done if a force acts at any angle to the motion.
Q.46 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. C C. A D. X
Q.47 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.48 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. 48.6 km/h C. 46.5 km/h D. 45.8 km/h

Q.49	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. Neither conclusion (I) nor (II) follows B. Both conclusions (I) and (II) follow C. Only conclusion (II) follows D. Only conclusion (I) follows
Q.50	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. 4 days B. 6 days C. 5 days D. 8 days
Q.51	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. 1 year D. 2.5 years
Q.52	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 meter per second B. 4.5 meter per second C. 3.5 meter per second D. 3 meter per second
Q.53	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. 6 hours B. 10 hours C. 7.5 hours D. 8 hours
Q.54	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. 7 B. 9 C. 4 D. 2
Q.55	Which property of a fuse wire ensures it melts quickly when excess current flows?
Ans	A. Low melting point B. High electrical resistance C. Thick wire D. High melting point

Q.56	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. 13.0% C. 13.7% D. 14.1%
Q.57	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. 71 B. 70 C. 73 D. 72
Q.58	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. HJVI C. HKVJ D. IJVJ
Q.59	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 more on the Moon than on Earth C. The object weighs the same on both the Moon and Earth D. The object weighs less on the Moon than on Earth
Q.60	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.61	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.62

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.63

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. ₹1,440

B. ₹1,380

C. ₹1,260

D. ₹1,200

Q.64

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. Enhanced biodegradation of plastics

C. Increased recycling rates of precious metals

D. Release of greenhouse gases from decomposition

Q.65

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. PDP

B. OCP

C. NDO

D. NBQ

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. ₹6,000

B. ₹8,000

C. ₹5,000

D. ₹9,000

Q.67

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 in a LAN provides low-speed data transfer and connects users over public Internet infrastructure.

B. A LAN always requires Gigabit Ethernet to function and is insecure because it allows open access to all network devices.

C. Ethernet is a standard that governs how devices in a LAN communicate via wired connections, supporting speeds from 10 Mbps to 1000 Mbps.

D. LANs are designed for long-distance communication and use Ethernet primarily for wireless data exchange.

Q.68	Simplify: $60 - \{(-8) \times (-16 - 19 - 2)\} \div [5 \times \{2 + (-1) \times (-1)\}]$
Ans	A. $\frac{594}{15}$ B. $\frac{614}{15}$ C. $\frac{608}{15}$ D. $\frac{604}{15}$
Q.69	Which feature is a requirement of the BIS drawing standard in engineering drawings?
Ans	A. Title block with specific information B. Use of colored pencils for clarity C. Freehand sketches without scale D. Margin lines of random width
Q.70	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 displacement divided by total time, and its unit is meter per second. C. Average velocity is the total distance divided by total time, and its unit is meter per second. D. Average velocity is the total distance divided by total time, and its unit is kilometer per hour.
Q.71	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 50 K. B. The temperature change is 30 K. C. The temperature change is 20 K. D. The temperature change is 15 K.
Q.72	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. Q B. S C. V D. P
Q.73	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 increased to 3.0 seconds B. It remains at 2.5 seconds C. It has decreased to 1.5 seconds D. It has decreased to 2.0 seconds

Q.74	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. Dashed line D. Chain thin line
Q.75	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. QK-VA B. WQ-CG C. EY-KO D. TN-ZD
Q.76	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. 20 km/h south C. 6.7 km/h north D. 33.3 km/h north
Q.77	Which component makes up the largest proportion of Earth's atmosphere by volume?
Ans	A. Argon B. Nitrogen C. Oxygen D. Carbon dioxide
Q.78	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. 22.6% profit C. 15.7% profit D. 20.9% profit
Q.79	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. 27 C. 53 D. 42
Q.80	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. $\sqrt{107}$ cm B. $\sqrt{97}$ cm C. $\sqrt{117}$ cm D. $\sqrt{119}$ cm

Q.81	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. Four B. Three C. Two D. One
Q.82	What is an email used for?
Ans	A. Creating documents B. File storage C. Sending messages D. Data processing
Q.83	In third angle projection, where is the object placed relative to the plane of projection?
Ans	A. The object is placed in the second quadrant B. The object is placed in the fourth quadrant C. The object is placed in the third quadrant D. The object is placed in the first quadrant
Q.84	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.85	What should come in place of the question mark (?) in the given series? 98, 104, 116, 134, 158, ?
Ans	A. 188 B. 186 C. 190 D. 184
Q.86	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. Establish preventive measures to control risks C. List all possible causes of failures D. Define the top event representing the injury
Q.87	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. 25 B. 23.5 C. 20.5 D. 24.5

Q.88	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. ₹10,000 B. ₹9,000 C. ₹12,000 D. ₹11,000
Q.89	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. 3 B. 0 C. 1 D. 2
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. 4 B. 7 C. 6 D. 5
Q.91	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.92	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. 480,000 joules B. 24,000 joules C. 12,000 joules D. 240,000 joules
Q.93	What do touch gestures in Microsoft Windows allow users to do?
Ans	A. Connect external devices B. Increase screen brightness C. Type faster on the keyboard D. Perform actions using finger movements

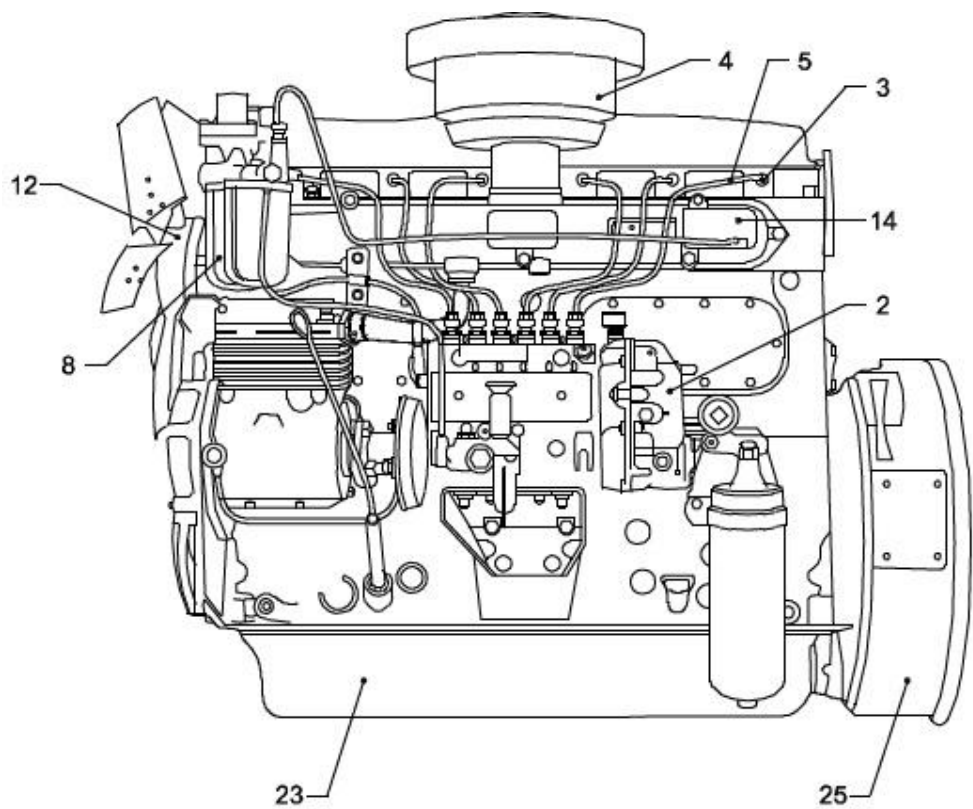
Q.94	16 is related to 260 following a certain logic. Following the same logic, 25 is related to 630. To which of the following is 9 related, following the same logic? (NOTE: Operations should be performed on the whole numbers, without breaking down the numbers into their constituent digits. E.g. 13 – 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. 729 B. 732 C. 78 D. 84
Q.95	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. 25 C. 28 D. 27
Q.96	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. Only the rectangular base outline will be visible in the front view drawing C. The outline of rectangular base and triangular prism will be visible but hole is not shown D. Only the triangular prism will be clearly visible in the front view drawing
Q.97	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. 40 km/h east B. 20 km/h east C. 50 km/h north D. 30 km/h east
Q.98	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.99	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 60 km per hour based only on the change in odometer readings. C. The car's average speed is 240 km per hour since that was the odometer reading at 9:30 am. D. The car's average speed is 40 km per hour as calculated from the odometer readings and time interval.

Q.100	Which situation best describes an entanglement hazard in a mechanical workshop?
Ans	A. Finger cut by a sharp edge B. Hand pinched between gears C. Loose clothing caught in a rotating shaft D. Gloves worn near hot surfaces

Section : PART-B	
Q.1	What impact does lock-up clutch engagement have on fuel consumption?
Ans	A. Reduces fuel economy by increasing losses B. Improves fuel economy by reducing slippage C. Increases slippage and fuel consumption D. No effect on fuel economy
Q.2	Ferrous metals generally contain major amounts of:
Ans	A. Iron B. Aluminium C. Zinc D. Copper
Q.3	A technician needs to improve the efficiency of combustion in a petrol engine. Which adjustment related to the spark plug could help achieve this goal?
Ans	A. Increasing the amount of engine current B. Ensuring correct spark plug gap for proper ignition C. Modifying the spark plug's diameter D. Adjusting the exhaust valve opening duration
Q.4	In a vernier caliper, the small scale that slides along the main scale is called:
Ans	A. Vernier scale B. Pitch scale C. Angular scale D. Limit gauge scale
Q.5	Where should an ammeter be connected in a circuit to measure current accurately?
Ans	A. With a resistor in parallel B. In series with the load C. In parallel with the load D. Across the supply terminals
Q.6	Which functional characteristic of soft hammers makes them most suitable for use during marking and assembly operations involving finished or precision surfaces?
Ans	A. Hardened striking surface enabling accurate indentation during marking with centre punches B. Ability to deform upon impact thereby preventing surface damage to marked or assembled components C. High rigidity of hammer face ensuring maximum force transmission during heavy forging operations D. Elevated mass concentration providing deeper penetration effect during high-energy striking tasks

Q.7	What is the main goal of safety legislation in a workshop?
Ans	A. To promote hazardous tasks in the workshop B. To reduce equipment quality in the workshop C. To protect workers from accidents and injuries D. To increase production speed in the workshop
Q.8	In a workshop, a mechanic needs to determine the length of the diagonal support for a rectangular metal plate with sides of 9 cm and 12 cm. Which value represents the correct length of the diagonal support needed?
Ans	A. 16 cm B. 14 cm C. 13.5 cm D. 15 cm
Q.9	In a conventional petrol engine assembly, which of the following locking devices is used to secure the connecting rod fasteners against loosening?
Ans	A. Plain washers fitted beneath the connecting rod bolt heads B. Tab washers or lock plates fitted with connecting rod nuts C. Spring washers used as the only locking arrangement D. Circlips installed in the connecting rod bearing housing
Q.10	A technician is selecting a cylinder material for a petrol engine. Which property is most important for ensuring long service life?
Ans	A. Moderate strength and easy machinability B. High thermal conductivity and wear resistance C. Low density and high electrical conductivity D. High specific heat and low cost
Q.11	Where are leaf springs most commonly used in vehicle suspension systems?
Ans	A. They are commonly used in the front suspension of small and medium vehicles like cars B. They are commonly used in the front suspension of motorcycles and bicycles C. They are commonly used in the steering mechanism of all kinds of vehicles D. They are commonly used in the rear suspension of trucks and commercial vehicles
Q.12	What is the primary function of the flute in a drill?
Ans	A. To reduce the weight of drill B. To add decorative features in drill C. To hold the drill in place D. To provide path for chip removal

Q.13 What is the name of the part marked as No. 2 in the engine diagram?



- Ans
- A. Air cleaner
 - B. F.I. Pump
 - C. Cylinder block
 - D. Fuel injector

Q.14 The fuel injector in a direct-injection diesel engine is generally positioned near the centre of the cylinder head primarily to:

- Ans
- A. Reduce cylinder head deformation by balancing combustion pressure on the casting
 - B. Improve coolant circulation around the combustion chamber while minimizing thermal stresses
 - C. Increase valve opening duration by providing symmetrical valve train geometry
 - D. Ensure uniform fuel distribution throughout the combustion chamber for efficient combustion

Q.15 Which material offers an optimal combination of toughness and ease of machining for the big end bearings of a diesel engine?

- Ans
- A. Aluminium alloy
 - B. Bronze
 - C. Copper-lead alloy
 - D. Cast iron

Q.16 What is the purpose of the Electronic Control Unit (ECU) using signals from the transmission fluid temperature sensor?

- Ans
- A. To cool the high-voltage battery
 - B. To adjust tire pressure automatically
 - C. To prevent shifting when fluid is too cold
 - D. To dim dashboard lights at night

Q.17 A magnetic core carries a magnetic flux of 0.02 Wb. If the cross-sectional area of the core is kept the same, which action will most directly increase the magnetic flux?

- Ans
- A. Using a material with higher resistance
 - B. Increasing the air gap in the magnetic path
 - C. Decreasing the magnetizing current
 - D. Increasing the number of turns or current producing the magnetomotive force

Q.18	When evaluating surface plate construction for use in a humid environment, which factor is most important to consider?
Ans	A. Color of the plate prevents moisture absorption B. Surface plate weight determines performance in humidity C. Visible surface markings ensure accuracy in humidity D. Material should resist corrosion and moisture effects
Q.19	If air enters the hydraulic brake lines, what is the most likely effect on brake performance?
Ans	A. The brakes do not require brake fluid when air is present B. The brakes generate less heat and cool faster C. The brakes work more effectively with air in the lines D. The brakes become less effective due to compressibility of air
Q.20	What is the primary purpose of using a neutral flame in gas welding?
Ans	A. To cause the surface hardening through carburization. B. To promote oxidation and strengthen the weld joint. C. To avoid oxidation and carburization of welded metal. D. To increase the carbon content of the welded metal.
Q.21	Which type of current changes both magnitude and direction at definite intervals?
Ans	A. Leakage current B. Alternating current C. Direct current D. Static current
Q.22	A copper wire has a resistance of 3 Ω and carries a current of 4 A. What is the power loss in the wire due to heating?
Ans	A. 36 W B. 7 W C. 48 W D. 12 W
Q.23	Which metal is a primary component of most soft solders used in electrical work?
Ans	A. Aluminum B. Nickel C. Copper D. Tin
Q.24	Which of the following is NOT a correct use of a chain line in engineering drawings?
Ans	A. To mark the path of a section B. To show the outer boundary of an object C. To indicate a surface to be machined D. To represent a part for heat treatment
Q.25	What value of inductor should be connected in parallel with a series combination of 4 H and 2 H so that the effective inductance of the circuit is 3 H?
Ans	A. 2 H B. 9 H C. 6 H D. 3 H

Q.26	How does wear on turbine blades affect the performance of a fluid coupling?
Ans	A. Decreases engine temperature permanently B. Reduces heat dissipation capability C. Causes loss of hydraulic fluid from the coupling D. Decreases power transmission efficiency
Q.27	Which part does the cylinder sleeve protect from direct contact with combustion gases?
Ans	A. Engine block B. Piston C. Connecting rod D. Crankshaft
Q.28	What is a primary challenge associated with increasing the compression ratio in internal combustion engines?
Ans	A. Increased engine lubrication B. Reduced fuel injection pressure C. Higher risk of engine knocking D. Lower engine temperature
Q.29	How does piston movement during the intake stroke affect the cylinder pressure?
Ans	A. Cylinder pressure decreases as piston moves down B. Cylinder pressure increases as piston moves up C. Cylinder pressure increases as piston moves down D. Cylinder pressure stays constant as piston moves up
Q.30	After setting a sine bar with slip gauges and placing the workpiece, which operation is performed to verify correct angle setting?
Ans	A. Mark surface using scribe for checking B. Sweep surface with dial test indicator tool C. Rotate sine bar to different position again D. Measure angle using standard protractor scale
Q.31	Which of the following materials is commonly used for making cylinder head gaskets in petrol engines?
Ans	A. Cast iron B. Copper and zinc alloy C. Asbestos-based composite D. Paper reinforced with resin
Q.32	Which tap type should NOT be used to initiate a new thread in a hole?
Ans	A. Bottoming tap B. Plug tap C. Taper tap D. Intermediate tap
Q.33	What distinguishes a wet sleeve from a dry sleeve in a diesel engine?
Ans	A. Wet sleeve is surrounded by coolant, dry sleeve is not B. Wet sleeve is smaller than dry sleeve C. Wet sleeve is made of plastic, dry sleeve is metal D. Wet sleeve is fixed permanently, dry sleeve is removable

Q.34	Which of the following materials is welded using an oxy-acetylene oxidizing flame to minimize zinc vaporization?
Ans	A. Cast iron B. Aluminum C. Stainless steel D. Brass
Q.35	If a file is too short for a given job, what is the most likely result during use?
Ans	A. Uneven surface finish and excess wear on the file B. Improves accuracy and provides better control C. Prevents bending and ensures file durability D. Greater filing efficiency and faster completion
Q.36	Which welding technique is best suited for precise and clean joining of thin sheet metal panels in automobile body fabrication?
Ans	A. Forge welding B. Submerged arc welding C. Friction welding D. Resistance spot welding
Q.37	Two magnetic paths are made of the same material and have the same cross-sectional area. Path X has length 0.1 m, and Path Y has length 0.3 m. Which statement is correct about their reluctances?
Ans	A. Path Y has one-third the reluctance of Path X B. Path X has greater reluctance because shorter length increases reluctance C. Both paths have the same reluctance because they are made of the same material D. Path Y has three times the reluctance of Path X
Q.38	Which operation cannot be performed efficiently with a half round file?
Ans	A. Finishing a flat edge B. Filing a rounded groove C. Smoothing an inside curve D. Sharpening a saw blade
Q.39	Which process commonly uses the oxy acetylene system in metalworking applications?
Ans	A. Cutting thick metal sheets in fabrication workshops B. Soldering thin wires in electronics manufacturing C. Arc welding stainless steel in electrical industries D. Annealing glass rods in laboratory settings
Q.40	A technician needs to inspect the internal diameter of a cylinder bore with high accuracy. Which combination of components in a dial bore gauge ensures accurate measurement and effective alignment inside the bore?
Ans	A. Mentions a digital display, measuring tape, and stationary handle. B. A dial indicator, interchangeable anvils, and a spring-loaded plunger. C. Includes the micrometer head, steel rule, and rubber grip to hold. D. Features a fixed anvil, locking screw, and a sliding vernier scale
Q.41	What does the magnetic permeability of a material represent?
Ans	A. The ability of a material to resist the flow of electric current B. The ability of a material to oppose the flow of magnetic flux C. The ability of a material to allow magnetic flux to pass through it D. The ability of a material to store energy in an electric field

Q.42	What is the main purpose of the Ackerman angle in a steering system?
Ans	A. To ensure correct turning of wheels during a turn B. To increase the turning radius of the vehicle C. To reduce the steering ratio for quick response D. To change the caster angle of the front wheels
Q.43	What is the primary reason for ensuring the tap is aligned correctly with the hole when tapping?
Ans	A. To reduce the tapping speed significantly B. To increase the amount of cutting fluid used C. To allow the use of improperly sharpened tap D. To produce accurate and straight threads
Q.44	What would most likely happen if the carburettor-type air cleaner is clogged with dirt?
Ans	A. Stable engine operation with no effect B. It will lead to increased exhaust back-pressure C. Improved combustion efficiency due to higher pressure D. It will lead to rich fuel mixture
Q.45	Which situation on the road clearly demonstrates the usefulness of the lock-up feature?
Ans	A. Driving on a highway at constant speed B. Accelerating hard from a standstill C. Reversing into a parking space D. Frequent stop-and-go city driving
Q.46	Which combination of components are essential for both the cooling and lubrication of a petrol engine?
Ans	A. Carburetor and alternator B. Radiator and oil pump C. Distributor and fuel pump D. Air cleaner and ignition coil
Q.47	What is the SI unit of magnetic flux?
Ans	A. Tesla B. Weber C. Henry D. Joule
Q.48	Which of the following components is primarily responsible for supporting the weight of the vehicle chassis in a suspension system?
Ans	A. Suspension control arm B. Shock absorber C. Leaf spring assembly D. Stabilizer (anti-roll) bar
Q.49	Which dimensioning method is used when the accumulation of tolerances has no effect on the function of the component?
Ans	A. Baseline dimensioning B. Reference dimensioning C. Parallel dimensioning D. Chain dimensioning

Q.50	A V-type petrol engine is characterized by which of the following features?
Ans	A. Cylinders are grouped around a central crankshaft B. Cylinders are arranged in two banks at an angle C. All cylinders are in a single straight row D. Cylinders are positioned opposite each other
Q.51	Which part of a taper shank drill ensures accurate alignment in the machine spindle?
Ans	A. Body length B. Flute C. Tapered end D. Point angle
Q.52	In a vernier caliper, 50 vernier scale divisions coincide with 49 main scale divisions. If one main scale division is 1 mm, what is the least count?
Ans	A. 0.04 mm B. 0.05 mm C. 0.01 mm D. 0.02 mm
Q.53	Which engine component is most directly affected by improper piston-to-cylinder clearance?
Ans	A. Crankshaft bearing surface B. Cylinder wall surface C. Camshaft surface D. Fuel injector surface
Q.54	Which characteristic should an ideal diesel combustion chamber have?
Ans	A. Delays ignition timing with voltage B. Increases cooling losses significantly C. Reduces intake air pressure drastically D. Promotes complete combustion process
Q.55	Why is an ammeter always connected in series with the load while measuring current in a circuit?
Ans	A. Because it stores charge before displaying the reading B. Because it must carry same current as load for correct measurement C. Because it increases the supply voltage across the load D. Because it has very high resistance and blocks excess current
Q.56	What is the primary function of a check valve during the pressure stroke?
Ans	A. To allow fluid to enter the lines B. To increase line temperature C. To block fluid from entering the lines D. To generate electrical signals
Q.57	A 2 kW electric heater operates for 45 minutes on its rated supply. How much electrical energy does it consume?
Ans	A. 5.4 kWh B. 0.75 kWh C. 90 kWh D. 1.5 kWh

Q.58	What is the role of the locking mechanism on a micrometer depth gauge?
Ans	A. To secure the measuring rod B. To rotate the thimble C. To display the measurement D. To control the base position
Q.59	What is the primary importance of frequent inspection of the vibration damper for proper engine functioning?
Ans	A. To maintain correct piston clearance B. To ensure effective vibration absorption C. To verify exhaust emission levels D. To check proper fuel delivery
Q.60	How does a Continuously Variable Transmission (CVT) system achieve reverse operation compared to forward?
Ans	A. It keeps the metal belt stationary during reversing B. It reverses the direction of the output pulley rotation C. It changes the input pulley diameter to its minimum D. It increases engine speed to maximum
Q.61	In which scenario would plastic gears be more appropriate than metal gears in a machine?
Ans	A. Plastic gears are ideal for high-load machinery due to their strength. B. Plastic gears are used in low-load devices where quiet operation is important. C. Plastic gears are preferred in high-temperature machines for better performance. D. Plastic gears are necessary in vehicle transmissions for improved durability.
Q.62	For ISO metric threads, the depth of thread (theoretical) is approximately:
Ans	A. $1.273 \times$ pitch value of the thread system B. $0.960 \times$ pitch value of the thread system C. $0.613 \times$ pitch value of the thread system D. $0.500 \times$ pitch value of the thread system
Q.63	Which problems may arise in engine performance due to excessive piston ring clearance?
Ans	A. Increases the strength of the piston assembly B. Loss of compression and reduced engine efficiency C. Improves combustion pressure and fuel economy D. Completely prevents oil consumption in the engine
Q.64	How does the base of a micrometer depth gauge differ from that of a standard micrometer?
Ans	A. It is circular to fit different holes B. It is flat and wide for stability on surfaces C. It is tapered for narrow slots D. It is C-shaped for hand grip
Q.65	Which method joins metals primarily by applying mechanical force at elevated temperature without filler material?
Ans	A. Fusion welding B. Soldering C. Brazing D. Pressure welding

Q.66	Which mallet feature is important for its use in sheet metal work?
Ans	A. A head made of wood or rubber B. A heated striking face C. A built-in measuring scale D. A sharp steel cutting edge
Q.67	Which statement best explains why both inlet and exhaust valves remain closed during the power stroke of a diesel engine?
Ans	A. To confine high-pressure combustion gases and convert their energy into useful work B. To increase the duration of fuel injection before the piston reaches Bottom Dead Centre C. To improve lubrication of the valve guides by reducing exhaust gas temperature D. To allow maximum heat transfer from the cylinder head to the piston crown
Q.68	What is the main purpose of an extension line in engineering drawing?
Ans	A. To show hidden features in a component B. To indicate the limits of a feature being dimensioned C. To mark the boundary of a drawing sheet D. To specify the required surface finish
Q.69	Why is it important to maintain a slightly convex hammer face rather than a perfectly flat one?
Ans	A. It reduces glancing blows and improves accuracy B. It increases the hardness of the hammer C. It improves heat resistance D. It reduces tool weight and helps maintain the posture
Q.70	In the master cylinder, which port gets sealed when the brake pedal is applied?
Ans	A. relief port B. intake port C. outlet valve D. bypass port
Q.71	What is a possible outcome if ATF is not cooled properly during operation over time?
Ans	A. The ATF will last longer than expected B. The transmission will self-adjust to conditions C. A complete rebuild of the transmission may be needed D. Internal parts are cleaned by hot fluid
Q.72	Why is it important to avoid overheating non-ferrous metals during soldering?
Ans	A. It improves electrical conductivity B. It can cause warping or oxidation C. It increases solder wettability D. It strengthens the joint
Q.73	Which type of seal is most commonly used to prevent oil leakage in a gearbox where the rotating shaft passes through the housing?
Ans	A. Gland packing. B. Radial lip seal. C. O-ring seal. D. Mechanical face seal.

Q.74 Which process involves joining two metals by melting them at the joint?

- Ans**
- A. Riveting
 - B. Brazing
 - C. Soldering
 - D. Welding

Q.75 A resistor has a voltage drop of 18 V and carries a current of 3 A. What is its resistance?

- Ans**
- A. 15 Ω
 - B. 6 Ω
 - C. 1/6 Ω
 - D. 54 Ω