RRB JE 2024 CBT-2 CMA

Chemical & Metallurgical Assistant (CMA) · CEN 03/2024 · CBT-2 · Technical Abilities · Question Paper

English

Complete Paper · 100 Questions · Technical Abilities Section · Official Answer Key

About this Compilation

This booklet contains the complete question paper of the **RRB JE 2024 CBT-2 (Chemical & Metallurgical Assistant (CMA))** examination in **English** (**Technical Abilities** section only), with the correct option marked as per the official answer key.

✓ Correct option (highlighted green)

1 of these 100 questions are shown in English. RRB did not release them in English to any candidate whose response sheet we could reach, so the official English version is printed instead and marked with an ENGLISH chip. Nothing here is machine translated.

How to use

- Use the **Index** page to jump directly to any set (clickable).
- Questions appear section by section in the order of the paper, numbered 1 onward.
- Diagram and wide-table questions appear at full width at the end of their section.
- The correct answer is highlighted in green with a tick.

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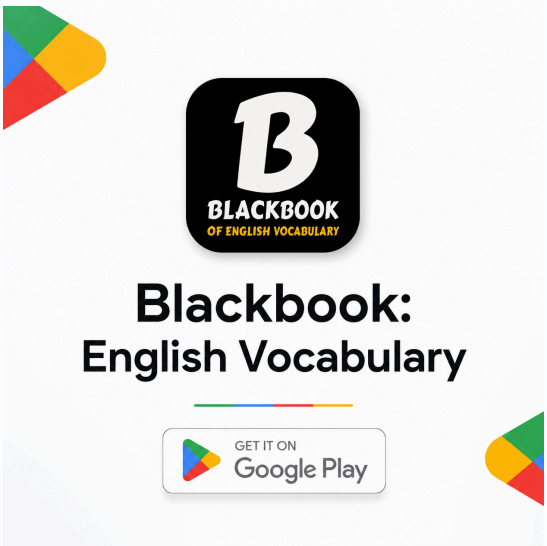

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Index — All Sets (click to open)

Set 1
22 Apr 2025
9:00 AM - 11:00 AM

Technical Abilities

100 Questions • Answer Key

Q1 Technical Abilities

In the chlor-alkali process, _____ is given off at the anode, and _____ at the cathode.

- A. chlorine gas, hydrogen gas ✓
- B. chlorine gas, oxygen gas
- C. chlorine gas, water vapour
- D. oxygen gas, hydrogen gas

Q2 Technical Abilities

Rahul stirs a spoonful of salt into a glass of water. After a while, he notices that the salt is no longer visible. What type of mixture has he created?

- A. Colloid
- B. Suspension
- C. Homogeneous mixture ✓
- D. Heterogeneous mixture

Q3 Technical Abilities

The earth's crust has only ____ carbon in the form of minerals (like carbonates, hydrogen carbonates, coal and petroleum).

- A. 0.02% ✓
- B. 20%
- C. 0.2%
- D. 2%

Q4 Technical Abilities

What will be the conventional direction of electric current flowing through an electric circuit?

- A. Perpendicular to the direction of the flow of electrons
- B. Opposite to the direction of the flow of electrons ✓
- C. Does not depend on the direction of the flow of electrons
- D. In the direction of the flow of electrons

Q5 Technical Abilities

The mass of a body is 'X' kg on the surface of the Earth. What will be the weight of this body (in newton) on the surface of the Earth?
(Take the value of g on Earth as 10 m/s^2)

- A. X/5
- B. 10X ✓
- C. X
- D. X/10

Q6 Technical Abilities

What did Rutherford's experiment prove about the structure of the atom?

- A. Atoms have a dense, positively charged nucleus. ✓
- B. Atoms are solid throughout.
- C. Atoms do not contain any empty space.
- D. Atoms are made only of electrons.

Q7 Technical Abilities

Which of the following is a real-life example of a neutralisation reaction?

- A. Dissolving sugar in tea
- B. Adding baking soda to vinegar in a volcano experiment ✓
- C. Heating lemon juice to concentrate its acidity
- D. Mixing salt in water to make a saline solution

Q8 Technical Abilities

A _____ pitch sound corresponds to more number of compressions and rarefactions passing a fixed point per unit time.

- A. low
- B. zero
- C. high and low
- D. high ✓

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Q9 Technical Abilities

According to Planck's quantum theory, energy is emitted or absorbed in:

A. continuous waves

B. discrete packets called quanta ✓

C. random energy bursts

D. infinite energy levels

Q10 Technical Abilities

What happens to the pH when a strong acid reacts with a strong base?

A. It remains unchanged.

B. It becomes 1.

C. It becomes 7. ✓

D. It becomes 14.

Q11 Technical Abilities

Which of the following is the correct pair of a physical quantity and its SI unit?

A. Pressure - Pascal ✓

B. Energy - ergs

C. Force - dyne

D. Power - kilowatt

Q12 Technical Abilities

Select the molecules where all bonds are single covalent bonds from the given list.

O_2, N_2, CH_4, CO_2, NH_3

A. NH_3 and CH_4 ✓

B. CO_2, CH_4 and NH_3

C. O_2 and CH_4

D. N_2 and NH_3

Q13 Technical Abilities

Which of the following laws explains the relationship between the pressure and solubility of a gas in a liquid?

A. Henry's Law ✓

B. Charles' Law

C. Raoult's Law

D. Avogadro's Law

Q14 Technical Abilities

Which of the following is NOT an example of forced convection?

A. Forced-air heating systems

B. Cooling system of an automobile engine

C. Heating up of ground more quickly than large bodies of water ✓

D. Human circulatory system

Q15 Technical Abilities

Identify whether the given statements are true or false.

Statement-I: An H-bond in case of HF molecule, alcohol or water molecules is an intermolecular hydrogen bond.
Statement-II: There is an intramolecular hydrogen bonding in an o-nitrophenol molecule.

A. Statement-I is true but Statement-II is false.

B. Both the statements are true. ✓

C. Statement-I is false but Statement-II is true.

D. Both the statements are false.

Q16 Technical Abilities

Why is metal refining important?

A. To convert metal oxides into metals

B. To remove unwanted impurities and obtain pure metal ✓

C. To increase impurities in metals

D. To make metals heavier

Q17 Technical Abilities

Which natural indicator turns dark pink in an acidic solution and green in a basic solution?

A. Turmeric

B. Litmus

C. Methyl orange

D. China rose (Hibiscus) ✓

Q18 Technical Abilities

Which of the following is a fundamental unit?

A. Kilogram (kg) ✓

B. Newton (N)

C. Joule (J)

D. Pascal (Pa)

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Q19 Technical Abilities

What is the principal quantum number (n) of the ground state of a hydrogen atom?

A. n = 0

B. n = 1 ✓

C. n = 3

D. n = 2

Q20 Technical Abilities

Beyond the breakdown voltage, the current in a Zener diode _____.

A. is completely independent of voltage

B. increases linearly with voltage

C. remains constant with voltage

D. changes by a large amount for a small change in voltage ✓

Q21 Technical Abilities

Given below are two statements. Read the statements carefully and select the correct option.

Statement I: Many metals, such as copper, zinc, tin, nickel, silver and gold, are refined electrolytically.
Statement II: In Electrolytic Refining, the impure metal is made the anode and a thin strip of pure metal is made the cathode.

A. Both Statements I and II are false.

B. Statement I is true but Statement II is false.

C. Statement I is false but Statement II is true.

D. Both Statements I and II are true. ✓

Q22 Technical Abilities

Which property is common to both mixtures and compounds?

A. Fixed composition

B. Made of two or more substances ✓

C. Physically separated into components

D. Homogeneous nature

Q23 Technical Abilities

Three resistors of resistances 2, 4 and 8 ohms are connected in parallel. What is the equivalent resistance?

A. 2.3 ohms

B. 3.1 ohms

C. 0.4 ohms

D. 1.1 ohms ✓

Q24 Technical Abilities

Which of the following is the simplest ketose?

A. Xylose

B. Glyceraldehyde

C. Dihydroxyacetone ✓

D. Erythrose

Q25 Technical Abilities

The corrosion of silver, copper and iron articles will produce _____, respectively.

A. silver sulphide, copper sulphide and iron oxide

B. silver oxide, copper carbonate and iron carbonate

C. silver sulphide, copper carbonate and iron oxide ✓

D. silver carbonate, copper carbonate and iron oxide

Q26 Technical Abilities

Zinc is extracted from zinc sulphide (ZnS) by first converting it into zinc oxide (ZnO). This is done by:

A. heating ZnS in the absence of air

B. direct electrolysis of ZnS

C. dissolving ZnS in acid

D. heating ZnS in the presence of air ✓

Q27 Technical Abilities

The metals high up in the reactivity series are very reactive. These metals are obtained by _____.

A. heating in absence of air

B. heating in air

C. heating with carbon

D. electrolytic reduction ✓

Q28 Technical Abilities

What is the nature of the magnetic field at the centre of a current-carrying circular loop?

A. Concentric circles

B. Radial lines

C. Zig-zag pattern

D. Straight lines ✓

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Q29 Technical Abilities

20 g of ice cubes at 0°C are put in 60 g of water in a tumbler. If the initial temperature of water is 40°C, then what will be the final temperature of water, assuming that no heat is lost to the surroundings?

(Take: Latent heat of ice = 80 cal/g; Specific heat capacity of water = 1 cal/g°C)

A. 100°C
B. 20°C
C. 10°C ✓
D. 50°C

Q30 Technical Abilities

Which of the following statement(s) is/are true regarding the boiling point of a liquid?

(i) The temperature at which the liquid and the vapour states of the substance coexist is called its boiling point.
(ii) The temperature at which the liquid and the solid states of the substance coexist is called its boiling point.
(iii) The boiling point for water is 273 K.

A. Both (ii) and (iii)
B. Only (ii)
C. Only (i) ✓
D. Both (i) and (iii)

Q31 Technical Abilities

If the pressure of an ideal gas is doubled and its volume is halved at constant temperature, what happens to the number of moles (n)?

A. It becomes zero.
B. It becomes half.
C. It doubles.
D. It remains the same. ✓

Q32 Technical Abilities

A medium has an absolute refractive index of √3. What will be the polarising angle for this medium?

A. 0°
B. 45°
C. 60° ✓
D. 30°

Q33 Technical Abilities

What does the pattern formed by iron filings around a magnet demonstrate?

A. The presence of an electric field around the magnet
B. The effect of friction on iron filings
C. The presence of gravitational force
D. The presence of a magnetic field around the magnet ✓

Q34 Technical Abilities

Which property of nylon makes it suitable for making ropes and fibres?

A. Brittle nature
B. Low melting point
C. High tensile strength ✓
D. High water absorption

Q35 Technical Abilities

Which of the following statement(s) is/are true regarding the production and propagation of sound waves?

(i) Sound is produced by vibrating objects.
(ii) Sound waves do not require a material medium for their propagation.
(iii) Sound waves fall in the category of non-mechanical waves.

A. Only (ii)
B. Both (i) and (iii)
C. Both (ii) and (iii)
D. Only (i) ✓

Q36 Technical Abilities

What will be the energy gained by an electron when it has been accelerated by a potential difference of 1 volt?

A. 602×10^{16} J
B. 1.602×10^{-16} J
C. 1.602×10^{19} J
D. 1.602×10^{-19} J ✓

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Q37 Technical Abilities

Which of the following is/are the use(s) of washing soda?

i. Sodium carbonate (washing soda) is used in glass, soap, and paper industries.
ii. It is used in the manufacture of sodium compounds such as borax.

A. ii only
B. Neither i nor ii
C. Both i and ii ✓
D. i only

Q38 Technical Abilities

Which method is used to separate iron-rich minerals like magnetite from unwanted materials?

A. Dissolving the mineral in a liquid
B. Using a magnet to attract the mineral ✓
C. Using bubbles to lift the mineral
D. Using water to wash away lighter materials

Q39 Technical Abilities

On heating gypsum at 373 K, it loses water molecules and becomes _____, called Plaster of Paris.

A. calcium sulphate dihydrate
B. calcium sulphate hemihydrate ✓
C. calcium sulphate
D. calcium sulphate trihydrate

Q40 Technical Abilities

Which of the following are physical properties?

i. Melting point
ii. Hardness
iii. Density
iv. Fluidity

A. i, ii, iii and iv ✓
B. i, iii and iv only
C. i, ii and iii only
D. i and ii only

Q41 Technical Abilities

Which of the following sets of quantum numbers (n, l, m_l, m_s) is NOT allowed for an electron in an atom?

A. (2, 1, −1, −1/2)
B. (3, 2, 1, +1/2)
C. (4, 3, −4, +1/2) ✓
D. (5, 2, 0, −1/2)

Q42 Technical Abilities

Identify the correct option in which the heat required to warm a given substance does not depend.

A. Atmospheric pressure ✓
B. Mass of the substance
C. Change in temperature
D. Nature of the substance

Q43 Technical Abilities

A solution turns blue litmus paper red. What does this indicate about the ions present in the solution?

A. The solution contains more OH^- ions than H^+ ions.
B. The solution contains no ions at all.
C. The solution contains more H^+ ions than OH^- ions. ✓
D. The solution contains equal amounts of H^+ and OH^- ions.

Q44 Technical Abilities

The melting point of a substance at standard atmospheric pressure is called it's _____.

A. absolute melting point
B. normal melting point ✓
C. thermal equilibrium point
D. standard freezing point

Q45 Technical Abilities

In which of the following materials is the energy gap (E_g) between the top of the valence band and bottom of the conduction band is between greater than 0.5 eV and less than 3 eV?

A. Insulators
B. Conductors
C. Superconductors
D. Semiconductors ✓

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Q46 Technical Abilities

The relation between displacement (X) of a particle and time (t) is given by the following equation: $X = At + Bt^2$. What will be the dimensions of A/B, if the equation is dimensionally correct?

A. $[T^3]$

B. $[T^{-3}]$

C. $[T]$ ✓

D. $[T^{-1}]$

Q47 Technical Abilities

Two isotopes, A and B, are present in a chlorine sample with 75% and 25% abundances, respectively. Their average atomic mass is 35.5 u, and the sum of their nucleons is 72. What are the number of nucleons in A and B, respectively?

A. 38 and 34

B. 37 and 35

C. 35 and 37 ✓

D. 34 and 38

Q48 Technical Abilities

What will be the energy gained by an electron with charge $q = 1.6\times10^{-19}$ C, when accelerated through a potential difference (ΔV) = 1 volt?

A. 6×10^{19} J

B. 10^{-19}J

C. 10^{19}J

D. 1.6×10^{-19}J ✓

Q49 Technical Abilities

Which of the following statements is/are true?

i. The covalent bond may be classified into two types depending upon the types of overlapping: (i) Sigma(σ) bond and (ii) pi(π) bond
ii. Basically, the strength of a bond depends upon the extent of overlapping.
iii. In case of sigma bond, the overlapping of orbitals takes place to a larger extent. Hence, it is stronger compared to the pi bond where the extent of overlapping occurs to a smaller extent.

A. i, ii and iii ✓

B. Only ii and iii

C. Only i and iii

D. Only i and ii

Q50 Technical Abilities

Identify the INCORRECT pair from the given options.

A. Aldehyde - Propanone ✓

B. Alkane having three carbon atoms - Propane

C. Alcohol - Propanol

D. Three-carbon chain with a ketone group - Propanone

Q51 Technical Abilities

If a liquid of density ρ and coefficient of viscosity η flow with a velocity v through a pipe of diameter D, then the Reynold's number is X.
If the velocity of the liquid flowing through the pipe increases to 2v and the diameter of the pipe is reduced to D/4 (keeping all the other parameters the same), the new Reynold's number is Y.
What will be the value of X : Y?

A. 4 : 1

B. 1 : 2

C. 1 : 4

D. 2 : 1 ✓

Q52 Technical Abilities

Why is it difficult to determine the exact position and velocity of an electron simultaneously?

A. Measuring one property affects the accuracy of the other. ✓

B. Electrons move at extremely high speeds in all directions.

C. Electrons do not follow the basic laws of physics.

D. Electrons are very small and cannot be detected easily.

Q53 Technical Abilities

What determines the shape of a molecule like CH_4?

A. The temperature at which the molecule is formed

B. The number of atoms in the molecule

C. The overlap of atomic orbitals ✓

D. The ionisation energy of atoms

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Q54 Technical Abilities

A car is moving in a straight line from city A to city B then city C. Let the distance between city A to B is 240 km and between city A and C is 320 km. The car moves from A to C in 6 hrs and back to B from C in 2 hrs. What will be the average velocity of the car?

A. 50 km/hr
B. 53.66 km/hr
C. 40 km/hr
D. 30 km/hr ✓

Q55 Technical Abilities

What does the Lewis symbol for an element represent?

A. The total number of electrons in an atom
B. The valence electrons of an atom ✓
C. The number of protons in an atom
D. The atomic mass of an element

Q56 Technical Abilities

When an electric current is passed through a metallic conductor, a nearby compass needle gets deflected. What is the reason for this deflection?

A. The electric current generates a magnetic field around the conductor, influencing the needle. ✓
B. The electric current produces heat in the conductor, affecting the needle.
C. The conductor gains magnetic properties due to heating.
D. The electric current creates an electric field that repels the needle.

Q57 Technical Abilities

Which of the following reactions is used for the industrial preparation of sodium hydroxide?

A. Decomposition of sodium bicarbonate
B. Heating sodium carbonate with calcium hydroxide
C. Electrolysis of sodium chloride solution ✓
D. Reaction of sodium with water

Q58 Technical Abilities

The binding energy of a nucleus gives a _____ contribution to the mass of the nucleus.

A. negligible
B. zero
C. negative ✓
D. positive

Q59 Technical Abilities

Identify the INCORRECT pair from the following options.

A. Tetrahydrofuran - heterocyclic
B. Thiophene - homocyclic ✓
C. Aniline - aromatic
D. Cyclopropane - homocyclic

Q60 Technical Abilities

Which of the following represents the correct electronic configuration of Chromium (Z = 24)?

A. [Ar] $3d^4\ 4s^2$
B. [Ar] $3d^5\ 4s^1$ ✓
C. [Ar] $3d^6\ 4s^0$
D. [Ar] $3d^3\ 4s^3$

Q61 Technical Abilities

Identify whether the given statements are true or false.

Statement-I: The word 'stoichiometry' is derived from two Greek words — stoicheion (meaning, element) and metron (meaning, measure).
Statement-II: Stoichiometry, thus, deals with the calculation of masses (sometimes volumes also) of the reactants and the products involved in a chemical reaction.

A. Statement-I is false but Statement-II is true.
B. Both the statements are true. ✓
C. Statement-I is true but Statement-II is false.
D. Both the statements are false.

Q62 Technical Abilities

Why was DDT widely used after World War II?

A. It acted as a natural fertiliser.
B. It was biodegradable and eco-friendly.
C. It increased soil fertility.
D. It helped control malaria and insect-borne diseases. ✓

Q63 Technical Abilities

The mass number of a nucleus is X, while its atomic number is Y. What will be the number of neutrons and protons, respectively, in the nucleus?

A. X and (X + Y)
B. Y and (X − Y)
C. (X + Y) and X
D. (X − Y) and Y ✓

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Q64 Technical Abilities

A packet of potato chips contains nitrogen gas. Why is nitrogen gas used instead of oxygen?

A. Oxygen is toxic for packaged food.

B. Nitrogen is lighter than oxygen.

C. Nitrogen prevents oxidation and rancidity. ✓

D. Nitrogen enhances the taste of chips.

Q65 Technical Abilities

What happens to the impurities during the electrolytic refining of copper?

A. They settle as anode mud. ✓

B. They evaporate as gas.

C. They dissolve in the electrolyte.

D. They deposit on the cathode.

Q66 Technical Abilities

How does electronegativity generally vary in the periodic table?

A. It decreases down a group and decreases across a period.

B. It increases down a group and increases across a period.

C. It increases down a group and decreases across a period.

D. It decreases down a group and increases across a period. ✓

Q67 Technical Abilities

Why are s-block elements highly reactive?

A. They have completely filled orbitals.

B. They have high ionisation enthalpy.

C. They have low atomic size.

D. They have low ionisation enthalpy. ✓

Q68 Technical Abilities

Which of the following statements is NOT true regarding infrared waves?

A. These rays are also referred as heat waves.

B. They are used in physical therapy.

C. They are help in maintaining the average temperature of the Earth.

D. They have wavelength much less than 700 nm. ✓

Q69 Technical Abilities

Which of the following statements about washing soda (Na2CO3·10H2O) are correct?

Statement 1: Washing soda is obtained from sodium hydroxide.
Statement 2: It is used to remove permanent hardness of water.
Statement 3: Washing soda is a hydrated salt.

A. All statements are correct.

B. Only Statements 1 and 3 are correct.

C. Only Statements 2 and 3 are correct. ✓

D. Only Statements 1 and 2 are correct.

Q70 Technical Abilities

Which of the following properties are usually shown by metals?

i. They have a lustre (shine).
ii. They conduct heat and electricity.
iii. They are malleable (can be hammered into thin sheets).

A. i, ii and iii ✓

B. i and ii only

C. i and iii only

D. ii and iii only

Q71 Technical Abilities BENGALI - no English version saved

নিচের কোনটি প্যাথোজেন ঘটিত জল দূষণের প্রধান উৎস?

A. শিল্প বর্জ্য

B. গার্হস্থ্য পয়ঃনিষ্কাশন এবং পশুদের মলমূত্র ✓

C. কৃষিক্ষেত্রের দূষিত জলের নিষ্কাশন

D. কারখানার ভারি ধাতু

Q72 Technical Abilities

Which of the following is the correct unit of coefficient of thermal conductivity in terms of Watt (W), metre (m) and Kelvin (K)?

A. $W\ m^{-1}\ K$

B. $W\ m^{-1}\ K^{-1}$ ✓

C. $W^{-1}\ m\ K$

D. $W\ m\ K$

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Q73 Technical Abilities

Which of the following statements is/are true?

i. In elements, in the free or the uncombined state, each atom bears an oxidation number of zero.
ii. For ions composed of only one atom, the oxidation number is equal to the charge on the ion.
iii. In all its compounds, fluorine has an oxidation number of −1.
iv. The algebraic sum of the oxidation number of all the atoms in a compound must be zero.

A. Only i and ii
B. Only i, ii and iii
C. i, ii, iii and iv ✓
D. Only i, iii and iv

Q74 Technical Abilities

Which of the following statements is true about the reactivity series of metals?

A. It is a list of metals arranged in order of their decreasing atomic numbers.
B. It is a list of metals arranged in order of their increasing reactivity.
C. It is a list of metals arranged in order of their decreasing reactivity. ✓
D. It is a list of metals arranged in order of their increasing atomic masses.

Q75 Technical Abilities

Which of the following is a physical intensive property?

A. Volume
B. Density ✓
C. Mass
D. Energy

Q76 Technical Abilities

Select the option that is correct regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion: The magnetic field lines do not form closed loops.
Reason: Magnetic field lines can never intersect.

A. Both assertion and reason are false.
B. Both assertion and reason are true and reason is the correct explanation of assertion.
C. Assertion is false but reason is true. ✓
D. Assertion is true but reason is false.

Q77 Technical Abilities

Newton per coulomb is the SI unit of _____.

A. electric potential
B. magnetic field
C. electric field ✓
D. magnetic potential

Q78 Technical Abilities

In longitudinal waves, which of the following options describes the direction of motion of the particles of the medium through which the wave is propagating?

A. Move in random directions
B. No motion of the particle
C. Move in a direction parallel to the direction of propagation ✓
D. Up and down about their mean position

Q79 Technical Abilities

Which of the following is a major cause of eutrophication in water bodies?

A. Presence of dissolved oxygen in water
B. Excessive use of pesticides in agriculture
C. High concentration of phosphates and nitrates ✓
D. Dumping of heavy metals into rivers

Q80 Technical Abilities

What does BJT stand for?

A. Binary Junction Transistor
B. Base Junction Transistor
C. Bipolar Junction Transistor ✓
D. Bi-layer Junction Transistor

Q81 Technical Abilities

What is the ratio of the total energy of the second excited state to that of the third excited state in a hydrogen atom?

A. 9/4
B. 16/9 ✓
C. 4/9
D. 9/16

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Q82 Technical Abilities

Which of the following metals does NOT occur in nature in a free state?

A. Gold

B. Silver

C. Platinum

D. Aluminium ✓

Q83 Technical Abilities

Given below are two statements. Read the statements carefully and select the correct option.

Statement I: p-Block Elements comprise those belonging to Group 13 to 18 of the modern periodic table.
Statement II: p-Block Elements, together with the s-Block Elements, are called the Representative Elements or Main Group Elements.

A. Statement I is false but Statement II is true.

B. Both Statements I and II are true. ✓

C. Statement I is true but Statement II is false.

D. Both Statements I and II are false.

Q84 Technical Abilities

A paper weight is kept on a tabletop. The mass of paper weight is 0.5 kg and its dimensions are 10 cm × 4 cm × 2 cm. Find the pressure exerted by the paper weight on the table top if it is made to lie on the table top with its sides of dimensions 10 cm × 2 cm. (Take g = 9.8 m/s^2)

A. 2420 Nm^{-2}

B. 612.5 Nm^{-2}

C. 49 Nm^{-2}

D. 2450 Nm^{-2} ✓

Q85 Technical Abilities

Which of the following statements is INCORRECT regarding the structure of benzene?

A. It has six carbon-carbon single bonds. ✓

B. It has six carbon atoms in a ring, each bonded to one hydrogen atom.

C. It has six carbon-hydrogen single bonds.

D. It is an unsaturated cyclic hydrocarbon.

Q86 Technical Abilities

Identify the INCORRECT pair from the given options.

A. Alkanes - Unsaturated hydrocarbons ✓

B. Alkynes - Contain one or more triple bonds

C. Hydrocarbon - Carbon and hydrogen

D. Alkenes - Contain one or more double bonds

Q87 Technical Abilities

During electrolytic refining, which of the following occurs at the anode?

A. Hydrogen gas formation

B. Reduction of metal

C. Metal deposition

D. Oxidation of metal ✓

Q88 Technical Abilities

Which of following statement(s) is/are true?

i. A mixture contains particles of two or more pure substances, which may be present in it in any ratio.
ii. Sugar solution and air are the examples of homogeneous mixtures.
iii. Mixtures of salt and sugar, grains and pulses along with some dirt (often stones), are heterogeneous mixtures.

A. ii and iii only

B. i, ii and iii ✓

C. i and ii only

D. i and iii only

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Q89 Technical Abilities

A potential difference (V) is applied for time (t) across the heating element of an electric geyser having a resistance (R). Which of the following is the correct relation between heat produced (H) in the geyser coil in terms of V, t, and R?

A. $H = \left(\frac{V^2R}{t}\right)$

B. $H = \frac{VR}{t}$

C. $H = \left(\frac{V^2}{R}\right)t$ ✓

D. H = VRt

Q90 Technical Abilities

Which of the following correctly represents the relation between the number of free electrons n_e and number of holes n_h for an intrinsic semiconductors?

A. $n_e < n_h$

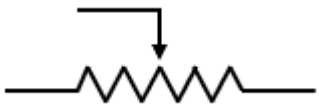
B. $n_e > n_h$

C. $n_e = n_h^2$

D. $n_e = n_h$ ✓

Q91 Technical Abilities

What is the correct name and function of the device represented by the given symbol?



A. Rheostat; used for varying the current flowing through a circuit. ✓

B. Battery; used for providing potential difference.

C. Switch; used for connecting and disconnecting the circuit.

D. Ammeter; used for measuring current flowing through a circuit.

Q92 Technical Abilities

Which of the following equations correctly defines the input resistance of the common emitter junction transistor?

A. $r_i = \frac{\Delta V_{BE}}{\Delta I_E}$ at constant V_{CE}

B. $r_i = \frac{\Delta V_{BE}}{\Delta I_B}$ at constant V_{CE} ✓

C. $r_i = \frac{\Delta V_{CE}}{\Delta I_E}$ at constant V_{BE}

D. $r_i = \frac{\Delta V_{CE}}{\Delta I_B}$ at constant V_{BE}

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Q93 Technical Abilities

In the chemical reaction ZnO + C → Zn + CO, ZnO is getting ____ and carbon is getting ____.

A. reduced; reduced

B. oxidised, oxidised

C. reduced; decomposed

D. reduced; oxidised ✓

Q94 Technical Abilities

A nucleus ${}^{A}_{Z}X$ undergoes beta minus (β^-) decay. What will happen to the atomic number of ${}^{A}_{Z}X$?

A. It will decrease by 2.

B. It will increase by 1. ✓

C. It will remain unchanged.

D. It will increase by 2.

Q95 Technical Abilities

For all angles of incidence greater than the critical angle, the wave will undergo what is known as total internal reflection. Which of the following is the correct formula for the critical angle?

(where $n_1 = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in first medium}}$ and $n_2 = \frac{\text{Speed of light in vacuum}}{\text{Speed of light in second medium}}$ and n_1 is greater than n_2)

A. $\tan i_c = \frac{n_2}{n_1}$

B. $\sin i_c = \frac{n_2}{n_1}$ ✓

C. $\tan i_c = \frac{n_1}{n_2}$

D. $\sin i_c = \frac{n_1}{n_2}$

Q96 Technical Abilities

Which of the following relations is correct for the actual frequency v_o and the apparent frequency v of a sound wave as observed by a stationary observer when the source of sound wave is moving towards the observer with velocity v_S? Take the actual velocity of the sound wave in the medium as v.

A. $\upsilon_o = \upsilon\left(1 + \frac{v_s}{v}\right)$

B. $\upsilon = \upsilon_o\left(1 + \frac{v}{v_s}\right)$

C. $\upsilon = \upsilon_o\left(1 + \frac{v_s}{v}\right)$

D. $\upsilon_o = \upsilon\left(1 - \frac{v_s}{v}\right)$ ✓

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Q97 Technical Abilities

A body is projected with a velocity $\vec{u} = 3\hat{i} + 4\hat{j}$ with respect to ground. At the highest point of motion of the body, what will be the magnitude of the vertical component of the velocity.

- **A.** 0 m/s ✓
- **B.** 5 m/s
- **C.** 3 m/s
- **D.** 4 m/s

Q98 Technical Abilities

Which of the following equations correctly represents the Ampere's circuital law?

- **A.** $\oint \vec{B} \cdot \vec{dl} = 2\mu_o I$
- **B.** $\oint \vec{B} \cdot \vec{dl} = \frac{\mu_0}{I}$
- **C.** $\oint \vec{B} \cdot \vec{dl} = \mu_0 I$ ✓
- **D.** $\oint \vec{B} \cdot \vec{dl} = \mu_o I^2$

Q99 Technical Abilities

As per the Bohr's second postulate, the electrons can revolve around a nucleus in only those orbits for which the angular momentum is an integral multiple of _____.

- **A.** $2\pi h$
- **B.** $\frac{2\pi}{h}$
- **C.** $\frac{2h}{\pi}$
- **D.** $\frac{h}{2\pi}$ ✓

Q100 Technical Abilities

When a beam of 5.5 MeV α-particles emitted from a $^{214}_{83}Bi$ radioactive source is allowed to fall on a thin foil of gold of thickness 2.1×10^{-7} m, then what percentage of an incident α-particles scatter by more than 1°.

- **A.** 0.14% ✓
- **B.** 0.014%
- **C.** 1.4%
- **D.** 14.0%

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