



रेलवे भर्ती बोर्ड / RAILWAY RECRUITMENT BOARD
सी ई एन नं. - 03/2024 / CEN No. - 03/2024



Test Date	22/04/2025
Test Time	2:30 PM - 4:30 PM
Subject	RRB JE Stage 2 CMA

* 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 : General Abilities

Q.1 If the absolute refractive index of a medium is less than 1, it means _____.

- Ans
- ☒ 1. light travels slower in that medium than in vacuum
 - ☒ 2. the medium absorbs all light
 - ☒ 3. the medium is a perfect reflector
 - ☒ 4. light travels faster in that medium than in vacuum

Q.2 The Millennium Development Goals (MDGs) aimed to reduce extreme poverty by which year?

- Ans
- ☒ 1. 2014
 - ☒ 2. 2015
 - ☒ 3. 2005
 - ☒ 4. 2008

Q.3 Which of the following is NOT toxic to non-target organisms in the soil?

- Ans
- ☒ 1. Fungicides
 - ☒ 2. Organic fertilisers
 - ☒ 3. Pesticides
 - ☒ 4. Herbicides

Q.4 What is the net force acting on an object if balanced forces are applied?

- Ans
- ☒ 1. Infinite
 - ☒ 2. Equal to acceleration
 - ☒ 3. Equal to the mass of the object
 - ☒ 4. Zero

Q.5 If an object is dropped from rest, what will be its velocity after 15 seconds? ($g = 9.8 \text{ m/s}^2$)

- Ans
- ☒ 1. 143 m/s
 - ☒ 2. 145 m/s
 - ☒ 3. 147 m/s
 - ☒ 4. 149 m/s

Q.6 Which of the following states is NOT covered under the Atal Bhujal Yojana?

- Ans
- ☒ 1. Maharashtra
 - ☒ 2. Jharkhand
 - ☒ 3. Uttar Pradesh
 - ☒ 4. Rajasthan

Q.7 In which of the following regions the Himalayas has the greatest width?

- Ans
- ☒ 1. Arunachal Pradesh
 - ☒ 2. Kashmir
 - ☒ 3. Sikkim
 - ☒ 4. Himachal Pradesh

Q.8 Who among the following inaugurated the 38th National Games held in Dehradun in January 2025?

- Ans
- ☒ 1. Pushkar Singh Dhami
 - ☒ 2. Narendra Modi
 - ☒ 3. Anurag Thakur
 - ☒ 4. Droupadi Murmu

Q.9 Which of the following is NOT a component of a CPU?

- Ans
- ☒ 1. Hard Disk
 - ☒ 2. Arithmetic Logic Unit (ALU)
 - ☒ 3. Control Unit (CU)
 - ☒ 4. Cache Memory

Q.10 Which of the following is NOT a source of release of smokestacks?

- Ans
- ☒ 1. Smelters
 - ☒ 2. Industries
 - ☒ 3. Thermal power plants
 - ☒ 4. Rivers

Q.11 Which Article provides Ministers the right to participate in parliamentary proceedings but without voting rights?

- Ans
- ☒ 1. Article 53
 - ☒ 2. Article 78
 - ☒ 3. Article 88
 - ☒ 4. Article 77

Q.12 Which of the following correctly explains why clothes dry faster on a windy day?

- Ans
- ☒ 1. Wind removes the water vapour from the clothes' surroundings.
 - ☒ 2. Wind decreases the temperature of the water molecules.
 - ☒ 3. Wind increases the humidity around the clothes.
 - ☒ 4. Wind reduces the surface area of the clothes.

Q.13 What is the primary purpose of using a firewall on a Personal Computer?

- Ans
- ☒ 1. To block unauthorised access and protect the computer
 - ☒ 2. To clean up temporary files
 - ☒ 3. To speed up internet connectivity
 - ☒ 4. To increase storage space

Q.14 Which of the following correctly represents the chemical formula of a compound formed by aluminium and sulphate ions?

- Ans**
- ☐ 1. $\text{Al}_3(\text{SO}_4)_2$
 - ☐ 2. Al_2SO_4
 - ☐ 3. $\text{Al}(\text{SO}_4)_3$
 - ☒ 4. $\text{Al}_2(\text{SO}_4)_3$

Q.15 According to the Tendulkar methodology, what was the estimated percentage of people below the poverty line in rural areas in 2011-12?

- Ans**
- ☒ 1. 25.7%
 - ☐ 2. 20%
 - ☐ 3. 27.5%
 - ☐ 4. 15.5%

Q.16 Inertia depends on which property of an object?

- Ans**
- ☐ 1. Acceleration
 - ☐ 2. Velocity
 - ☐ 3. Shape
 - ☒ 4. Mass

Q.17 What happens when an acid reacts with a metal oxide?

- Ans**
- ☒ 1. A salt and water are formed.
 - ☐ 2. A salt and hydrogen gas are formed.
 - ☐ 3. Only water is formed.
 - ☐ 4. Only salt is formed.

Q.18 Which official in the Gupta administration was responsible for peace and war matters?

- Ans**
- ☒ 1. Sandhi-Vigrahika
 - ☐ 2. Mahadandanayaka
 - ☐ 3. Vishayapati
 - ☐ 4. Mahapratihara

Q.19 Which defect of vision occurs due to the weakening of ciliary muscles with age?

- Ans**
- ☐ 1. Myopia
 - ☐ 2. Astigmatism
 - ☒ 3. Presbyopia
 - ☐ 4. Hypermetropia

Q.20 What is the purpose of the Collation option in the Print settings?

- Ans**
- ☒ 1. To print all the pages of a document as a set
 - ☐ 2. To change the printer selection
 - ☐ 3. To adjust the page orientation
 - ☐ 4. To select a custom print range

Q.21 What is the first step to securing ones smartphone or tablet?

- Ans**
- ☐ 1. Using only free Wi-Fi networks
 - ☐ 2. Turning off mobile data
 - ☐ 3. Installing more apps
 - ☒ 4. Setting a password/PIN-protected lock screen

Q.22	Which of the following is a characteristic difference between colloids and true solutions?
Ans	<div><div><input type="checkbox"/></div><div>1. True solutions have visible solute particles, whereas colloids have invisible dispersed particles.</div></div> <div><div><input type="checkbox"/></div><div>2. True solutions exhibit Brownian motion, but colloids do not.</div></div> <div><div><input type="checkbox"/></div><div>3. True solutions show the Tyndall effect, but colloids do not.</div></div> <div><div><input checked="" type="checkbox"/></div><div>4. True solutions have a single-phase system, whereas colloids have a two-phase system.</div></div>
Q.23	What happens when a computer is put into Sleep mode?
Ans	<div><div><input type="checkbox"/></div><div>1. It restarts automatically after a few minutes.</div></div> <div><div><input type="checkbox"/></div><div>2. It shuts down completely.</div></div> <div><div><input type="checkbox"/></div><div>3. It stores data on the hard drive and powers off.</div></div> <div><div><input checked="" type="checkbox"/></div><div>4. It keeps the session active in RAM while using minimal power.</div></div>
Q.24	The primary agent that helps in the decomposition of biodegradable matter in domestic sewage is _____.
Ans	<div><div><input type="checkbox"/></div><div>1. nitrate</div></div> <div><div><input type="checkbox"/></div><div>2. phosphate</div></div> <div><div><input checked="" type="checkbox"/></div><div>3. bacterium</div></div> <div><div><input type="checkbox"/></div><div>4. chloride</div></div>
Q.25	The Industrial Policy Resolution of 1956 categorised industries into how many groups?
Ans	<div><div><input type="checkbox"/></div><div>1. Seven</div></div> <div><div><input type="checkbox"/></div><div>2. Five</div></div> <div><div><input type="checkbox"/></div><div>3. Nine</div></div> <div><div><input checked="" type="checkbox"/></div><div>4. Three</div></div>
Q.26	What was the main objective of the Extremists during the Indian National Movement?
Ans	<div><div><input type="checkbox"/></div><div>1. To bring social reforms</div></div> <div><div><input type="checkbox"/></div><div>2. To expand the legislative councils</div></div> <div><div><input type="checkbox"/></div><div>3. To promote British goods in India</div></div> <div><div><input checked="" type="checkbox"/></div><div>4. To attain complete independence (Swaraj)</div></div>
Q.27	Which of the following companies announced plans in February 2025 to construct the world's longest undersea cable, aiming to enhance internet connectivity across five continents, with landing points in India?
Ans	<div><div><input type="checkbox"/></div><div>1. Google</div></div> <div><div><input type="checkbox"/></div><div>2. Amazon</div></div> <div><div><input checked="" type="checkbox"/></div><div>3. Meta</div></div> <div><div><input type="checkbox"/></div><div>4. Microsoft</div></div>
Q.28	The main use of chlorofluorocarbons is in _____.
Ans	<div><div><input type="checkbox"/></div><div>1. smog</div></div> <div><div><input type="checkbox"/></div><div>2. vehicles</div></div> <div><div><input type="checkbox"/></div><div>3. chimneys</div></div> <div><div><input checked="" type="checkbox"/></div><div>4. refrigerants</div></div>
Q.29	What is the approximate pH of a neutral salt solution?
Ans	<div><div><input checked="" type="checkbox"/></div><div>1. Equal to 7</div></div> <div><div><input type="checkbox"/></div><div>2. Depends on the temperature</div></div> <div><div><input type="checkbox"/></div><div>3. Less than 7</div></div> <div><div><input type="checkbox"/></div><div>4. More than 7</div></div>

Q.30 In an electric circuit, what is the correct way to connect an ammeter?

- Ans
- ☐ 1. In parallel with the source
 - ☐ 2. In parallel with the component
 - ☒ 3. In series with the component
 - ☐ 4. In either series or parallel

Q.31 The fine powder that is obtained from the modified and recycled form of plastic is called _____.

- Ans
- ☒ 1. polyblend
 - ☐ 2. polythene
 - ☐ 3. polyethylene
 - ☐ 4. polystyrene

Q.32 The energy that is derived from the use of radioactive isotopes is termed as _____.

- Ans
- ☐ 1. solar energy
 - ☐ 2. thermal energy
 - ☐ 3. geothermal energy
 - ☒ 4. nuclear energy

Q.33 What is the primary function of the F4 key in MS Excel when editing a cell reference in a formula?

- Ans
- ☐ 1. Repeats the last action
 - ☒ 2. Toggles between absolute and relative references
 - ☐ 3. Opens the Find and Replace dialog
 - ☐ 4. Refreshes the worksheet

Q.34 Which of the following cities hosted the inaugural Kho Kho World Cup in January 2025?

- Ans
- ☒ 1. New Delhi
 - ☐ 2. Kolkata
 - ☐ 3. Chennai
 - ☐ 4. Mumbai

Q.35 Which of the following is the correct way to insert a new column in a spreadsheet?

- Ans
- ☒ 1. Go to Home > Insert > Insert Sheet Columns.
 - ☐ 2. Press Ctrl + X and then Insert.
 - ☐ 3. Use Ctrl + Z to insert a column.
 - ☐ 4. Go to File > New > Column.

Q.36 The maximum sound is generated _____.

- Ans
- ☐ 1. from industrial smoke
 - ☐ 2. from house chimneys
 - ☒ 3. by the take off of a jet plane
 - ☐ 4. from vehicular emissions

Q.37 If you want the primary recipient to see that others have received a copy of an email, you should enter their email addresses in the _____ field.

- Ans
- ☐ 1. To
 - ☒ 2. Cc
 - ☐ 3. Bcc
 - ☐ 4. Subject

Q.38 The glass panel used in greenhouses is known to retain _____.

- Ans
- ☐ 1. pH
 - ☒ 2. heat
 - ☐ 3. humidity
 - ☐ 4. rainfall

Q.39 The practice of Jhum cultivation is prevalent in the _____.

- Ans
- ☐ 1. North west
 - ☐ 2. South west
 - ☐ 3. South east
 - ☒ 4. North east

Q.40 What is the shortcut key to start a slideshow from the beginning?

- Ans
- ☐ 1. Ctrl + P
 - ☐ 2. Alt + Tab
 - ☐ 3. Shift + F5
 - ☒ 4. F5

Q.41 The Rudra Veena is predominantly associated with which genre of Hindustani music?

- Ans
- ☐ 1. Khayal
 - ☒ 2. Dhrupad
 - ☐ 3. Thumri
 - ☐ 4. Ghazal

Q.42 Which state of matter shows the highest expansion when temperature is increased?

- Ans
- ☐ 1. Liquids
 - ☐ 2. Solids
 - ☐ 3. Plasma
 - ☒ 4. Gases

Q.43 Dr. BR Ambedkar described which part of the Indian Constitution as its 'novel features', while Granville Austin referred to it as the 'Conscience of the Constitution'?

- Ans
- ☐ 1. Fundamental Duties
 - ☐ 2. Fundamental Rights
 - ☐ 3. Preamble
 - ☒ 4. Directive Principles of State Policy

Q.44 Which of the following CANNOT be considered as a measure to control global warming?

- Ans
- ☐ 1. Efficiently using energy
 - ☐ 2. Reduction in emission of greenhouse gases
 - ☒ 3. Causing deforestation
 - ☐ 4. Cutting down use of fossil fuel

Q.45 What is India's global military ranking in the 2025 Global Firepower (GFP) index?

- Ans
- ☐ 1. 3rd
 - ☐ 2. 5th
 - ☐ 3. 2nd
 - ☒ 4. 4th

Q.46 Identify the correct formula for the compound formed between Mg^{2+} and PO_4^{3-} ions.

- Ans**
- ☐ 1. $\text{Mg}_2(\text{PO}_4)_3$
 - ☒ 2. $\text{Mg}_3(\text{PO}_4)_2$
 - ☐ 3. $\text{Mg}(\text{PO}_4)_3$
 - ☐ 4. MgPO_4

Q.47 What does PCB stand for?

- Ans**
- ☐ 1. Processing Circuit Board
 - ☒ 2. Printed Circuit Board
 - ☐ 3. Peripheral Connection Bus
 - ☐ 4. Primary Control Board

Q.48 Why does a bee sting cause pain and irritation?

- Ans**
- ☐ 1. The sting injects a mild sugar solution.
 - ☐ 2. The sting contains a strong base.
 - ☒ 3. The sting injects methanoic acid.
 - ☐ 4. The sting releases carbon dioxide gas.

Q.49 What is the maximum number of Ministers allowed in the Council of Ministers, including the Prime Minister, as per the 91st Amendment Act?

- Ans**
- ☐ 1. 10% of Lok Sabha strength
 - ☒ 2. 15% of Lok Sabha strength
 - ☐ 3. 20% of Lok Sabha strength
 - ☐ 4. 12% of Lok Sabha strength

Q.50 The phenomenon of multiple echoes due to repeated reflections is called _____.

- Ans**
- ☐ 1. diffraction
 - ☐ 2. resonance
 - ☐ 3. refraction
 - ☒ 4. reverberation

Section : Technical Abilities

Q.1 A neutralisation reaction occurs when _____ react with each other.

- Ans**
- ☐ 1. salt and water
 - ☐ 2. two acids
 - ☒ 3. an acid and a base
 - ☐ 4. two bases

Q.2 Read the given two statements and select the correct option.

Statement-I: At constant volume, pressure of a fixed amount of gas varies directly with the temperature.

Statement-II: Each line of pressure vs temperature (Kelvin) graph at constant molar volume is called isochore.

- Ans**
- ☐ 1. Both Statement-I and Statement-II are false.
 - ☐ 2. Statement-I is true but Statement-II is false.
 - ☐ 3. Statement-I is false but Statement-II is true.
 - ☒ 4. Both Statement-I and Statement-II are true.

Q.3 Which of the following statement(s) is/are true?

- i. The study of emission or absorption spectra is referred to as spectroscopy.
- ii. The spectrum of radiation emitted by a substance that has absorbed energy is called an emission spectrum.
- iii. The element helium (He) was discovered in the sun by a spectroscopic method.

- Ans**
- ☒ 1. ii only
 - ☒ 2. i only
 - ☒ 3. iii only
 - ☒ 4. i, ii and iii

Q.4 Which of the following correctly describes the trend of ionic radius across a period?

- Ans**
- ☒ 1. Ionic radius increases from left to right across a period.
 - ☒ 2. Cations decrease in size and anions increase in size across a period.
 - ☒ 3. Ionic radius increases uniformly across a period.
 - ☒ 4. Ionic radius remains the same for all elements in a period.

Q.5 In the reaction, $2\text{Cu} + \text{O}_2 \rightarrow 2\text{CuO}$, which substance is oxidised?

- Ans**
- ☒ 1. Copper Oxide (CuO)
 - ☒ 2. Oxygen (O_2)
 - ☒ 3. Copper (Cu)
 - ☒ 4. Both Cu and O_2

Q.6 Which of the following green chemistry strategies is used to minimise solvent waste?

- Ans**
- ☒ 1. Using excess petroleum-based solvents
 - ☒ 2. Increasing the number of solvents used in reactions
 - ☒ 3. Using water as a solvent in reactions
 - ☒ 4. Disposing of solvents after a single use

Q.7 Which of the following statements is NOT correct in reference to the melting point?

- Ans**
- ☒ 1. The temperature at which the liquid and the gaseous states of the substance are in thermal equilibrium with each other is called its melting point.
 - ☒ 2. The temperature at which the solid and the liquid states of the substance are in thermal equilibrium with each other is called its melting point.
 - ☒ 3. Melting point also depends on pressure.
 - ☒ 4. The melting point is characteristic of the substance.

Q.8 Which of the following is the correct definition of the electric potential due to a positive charge Q at a point r from it?

- Ans**
- ☒ 1. $V = \frac{Q}{4\pi\epsilon r^2}$
 - ☒ 2. $V = \frac{Q}{4\pi\epsilon r^3}$
 - ☒ 3. $V = -\frac{Q}{4\pi\epsilon r}$
 - ☒ 4. $V = \frac{Q}{4\pi\epsilon r}$

Q.9 Given below are two statements. Read the statements carefully and select the correct option.

Statement I: Properties of a compound are different from those of its constituent elements, whereas a mixture shows the properties of its constituting elements or compounds.

Statement II: The constituents of a mixture can be separated fairly easily by physical methods, whereas the constituents of a compound can be separated only by chemical or electrochemical reactions.

- Ans**
- ☒ 1. Both Statements I and II are true.
 - ☐ 2. Both Statements I and II are false.
 - ☐ 3. Statement I is false but Statement II is true.
 - ☐ 4. Statement I is true but Statement II is false.

Q.10 The phenomenon of perfect diamagnetism in superconductors is known as:

- Ans**
- ☐ 1. ferromagnetic effect
 - ☐ 2. Biot-Savart Law
 - ☐ 3. electromagnetic effect
 - ☒ 4. Meissner effect

Q.11 The voltmeter is always connected _____ across the points between which the potential difference is to be measured.

- Ans**
- ☐ 1. in any random manner
 - ☒ 2. in parallel
 - ☐ 3. at an angle to the circuit
 - ☐ 4. in series

Q.12 Consider that a nucleus with $A = 240$ is breaking into two fragments each of $A = 120$. What will be the total gain in binding energy, if binding energy per nucleon (E_{bn}) for $A = 240$ nucleus is about 7.6 MeV and for the two $A = 120$ fragment nuclei is about 8.5 MeV?

- Ans**
- ☒ 1. 216 MeV
 - ☐ 2. 204 MeV
 - ☐ 3. 182.4 MeV
 - ☐ 4. 240 MeV

Q.13 In which of the following mediums is the speed of sound maximum at 25°C ?

- Ans**
- ☐ 1. Vacuum
 - ☐ 2. Gases
 - ☒ 3. Solids
 - ☐ 4. Liquids

Q.14 Given below are two statements. Read the statements carefully and select the correct option.

Statement I: A reaction in which a single product is formed from two or more reactants is known as a combination reaction.

Statement II: Calcium oxide reacts vigorously with water to produce slaked lime (calcium hydroxide); this is a combination reaction.

- Ans**
- ☒ 1. Both Statements I and II are true.
 - ☐ 2. Statement I is true but Statement II is false.
 - ☐ 3. Both Statements I and II are false.
 - ☐ 4. Statement I is false but Statement II is true.

Q.15 According to Henry's law, the solubility of a gas in a liquid is directly proportional to which factor?

- Ans**
- ☒ 1. Partial pressure of the gas
 - ☐ 2. Volume of the gas
 - ☐ 3. Density of the liquid
 - ☐ 4. Temperature of the liquid

Q.16 In Young's double-slit experiment (using two coherent sources of the same intensity), the resultant intensity at a point on the screen is X, when the path difference is $\lambda/3$ (λ being the wavelength of light used). What will be the ratio of X and Y, where Y is the maximum resultant intensity?

- Ans**
- ☐ 1. $4/3$
 - ☒ 2. $1/4$
 - ☐ 3. $1/2$
 - ☐ 4. $3/4$

Q.17 Why does hydrogen fluoride (HF) form stronger hydrogen bonds than water (H_2O) even though water has more hydrogen bonding sites?

- Ans**
- ☐ 1. Water has a symmetrical structure that reduces hydrogen bonding strength.
 - ☒ 2. Fluorine is the most electronegative element, creating a stronger dipole.
 - ☐ 3. The H-F bond is weaker than the H-O bond, allowing better hydrogen bonding.
 - ☐ 4. HF has a lower molecular mass, making it more reactive.

Q.18 What does the principal quantum number (n) determine?

- Ans**
- ☒ 1. Size and energy of the orbital
 - ☐ 2. Charge of the nucleus
 - ☐ 3. Orientation of the orbital
 - ☐ 4. Shape of the orbital

Q.19 The formation of magnesium oxide (MgO) from magnesium and oxygen is a/an _____ reaction.

- Ans**
- ☒ 1. combination
 - ☐ 2. endothermic
 - ☐ 3. displacement
 - ☐ 4. neutralisation

Q.20 The products of the reaction between ethanoic acid and carbonates and hydrogen carbonates are:

- Ans**
- ☐ 1. sodium acetate, carbon monoxide and water
 - ☒ 2. sodium acetate, carbon dioxide and water
 - ☐ 3. sodium acetate, carbon dioxide and hydrogen gas
 - ☐ 4. ethanol, carbon dioxide and water

Q.21 An alternating current source is applied across a full-wave rectifier. Which of the following will be true regarding the output obtained?

- Ans**
- ☐ 1. The output will be alternating current.
 - ☐ 2. The output will be initially direct current and then alternating current.
 - ☐ 3. The output will be initially alternating current and then direct current.
 - ☒ 4. The output will be pulsating direct current.

Q.22 Which of the following is/are used as olfactory indicators?

- i. Vanilla
- ii. Onion
- iii. Clove

- Ans**
- ☒ 1. All i, ii, and iii
 - ☐ 2. i and ii only
 - ☐ 3. i only
 - ☐ 4. i and iii only

Q.23 Which of the following ions is present in washing soda?

- Ans**
- ☐ 1. Nitrate ion
 - ☒ 2. Carbonate ion
 - ☐ 3. Sulphate ion
 - ☐ 4. Chloride ion

Q.24 If the height of the image is 2 times the height of the object, then the linear magnification is _____.

- Ans**
- ☐ 1. 1/2
 - ☐ 2. 0.75
 - ☐ 3. 1
 - ☒ 4. 2

Q.25 Which of the following monomers is used in the production of polythene?

- Ans**
- ☒ 1. Ethene
 - ☐ 2. Propene
 - ☐ 3. Vinyl chloride
 - ☐ 4. Styrene

Q.26 What will be the shape of the magnetic field lines inside a current carrying solenoid?

- Ans**
- ☐ 1. Straight but not parallel
 - ☐ 2. Circular and parallel
 - ☐ 3. No field lines exists inside the solenoid
 - ☒ 4. Parallel and straight

Q.27 The radioactive decay constant (in the law of radioactive decay) is also called _____.

- Ans**
- ☐ 1. half-life coefficient
 - ☐ 2. activity constant
 - ☐ 3. nuclear stability factor
 - ☒ 4. disintegration constant

Q.28 Which of the following SI units is INCORRECTLY matched with its physical quantity?

- Ans**
- ☐ 1. Electric charge – Coulomb (C)
 - ☐ 2. Power – Watt (W)
 - ☒ 3. Pressure – Newton per metre (N/m)
 - ☐ 4. Work – Joule (J)

Q.29 Which of the following is the correct relation between the coefficient of linear expansion (α_L) and the coefficient of volumetric expansion (α_V)?

- Ans**
- ☒ 1. $\alpha_L = \frac{\alpha_V}{2}$
 - ☒ 2. $\alpha_L = 2\alpha_V$
 - ☒ 3. $\alpha_L = \frac{\alpha_V}{3}$
 - ☒ 4. $\alpha_L = 3\alpha_V$

Q.30 Which of the following environmental benefits is associated with using ethanol as a fuel?

- Ans**
- ☒ 1. Reduces deforestation
 - ☒ 2. Increases fossil fuel reserves
 - ☒ 3. Lowers greenhouse gas emissions
 - ☒ 4. Enhances soil fertility

Q.31 What is/are collected as anode mud during electrolytic refining?

- Ans**
- ☒ 1. Pure metal
 - ☒ 2. Impurities
 - ☒ 3. Hydrogen gas
 - ☒ 4. Electrolyte solution

Q.32 Which of the following everyday activities is a chemical change?

- Ans**
- ☒ 1. Dissolving sugar in water
 - ☒ 2. Breaking a pencil
 - ☒ 3. Cooking an egg
 - ☒ 4. Cutting an apple

Q.33 A student mixed lead(II) nitrate solution with potassium iodide solution. What was observed?

- Ans**
- ☒ 1. Evolution of hydrogen gas
 - ☒ 2. No visible change
 - ☒ 3. Formation of a yellow precipitate
 - ☒ 4. Change in colour to green

Q.34 A car moves along a circular track of radius 50 m with a speed of 10 m/s. What is its centripetal acceleration?

- Ans**
- ☒ 1. 4 m/s²
 - ☒ 2. 2 m/s²
 - ☒ 3. 5 m/s²
 - ☒ 4. 10 m/s²

Q.35 Which of the following statements is true for a solenoid?

- Ans**
- ☒ 1. A solenoid is commonly used to obtain a uniform magnetic field.
 - ☒ 2. A solenoid is commonly used to obtain a non-uniform magnetic field.
 - ☒ 3. A solenoid is commonly used to obtain a non-uniform electric field.
 - ☒ 4. A solenoid is commonly used to obtain a uniform electric field.

Q.36 If the pressure of a gas is doubled while keeping the temperature constant, what happens to its volume?

- Ans**
- ☒ 1. It remains the same
 - ☒ 2. It becomes four times
 - ☒ 3. It becomes half
 - ☒ 4. It doubles

Q.37 Which of the following options is **INCORRECT** in reference to a ferromagnetic substance?

- Ans**
- ☒ 1. In a ferromagnetic material, the field lines are highly concentrated.
 - ☒ 2. In hard ferromagnetic, the magnetisation persists on removal of the external field.
 - ☒ 3. In soft ferromagnetic, the magnetisation disappears on removal of the external field.
 - ☒ 4. The ferromagnetic property is independent of the temperature.

Q.38 Consider the two vectors, vector A of magnitude 4 units and vector B of magnitude 5 units. If the angle between the two vectors is 60° , then find the scalar product of vector A and vector B.

- Ans**
- ☒ 1. $10\sqrt{3}$
 - ☒ 2. 30
 - ☒ 3. 10
 - ☒ 4. 0

Q.39 Given below are two statements. Read the statements carefully and select the correct option.

Statement I: All bases do not dissolve in water.
Statement II: Bases that are soluble in water are called alkalis.

- Ans**
- ☒ 1. Both Statements I and II are false.
 - ☒ 2. Statement I is true but Statement II is false.
 - ☒ 3. Both Statements I and II are true.
 - ☒ 4. Statement I is false but Statement II is true.

Q.40 Some solute particles in a solution collide with the solid solute particles and get separated out of the solution. This process is known as ____.

- Ans**
- ☒ 1. association
 - ☒ 2. dissociation
 - ☒ 3. dissolution
 - ☒ 4. crystallisation

Q.41 Which of the following statements is/are true?

- i. Polyesters are the polycondensation products of dicarboxylic acids and diols.
- ii. Dacron or terylene is the best known example of polyesters.
- iii. Dacron fibre (terylene) is crease resistant and is used in blending with cotton and wool fibres and also as glass reinforcing materials in safety helmets, etc.

- Ans**
- ☒ 1. i, ii and iii
 - ☒ 2. Only ii
 - ☒ 3. Only i
 - ☒ 4. Only iii

Q.42 The two characteristic features seen in carbon, that is, _____ and _____, when put together, give rise to a large number of compounds.

- Ans**
- ☒ 1. tetravalency; covalency
 - ☒ 2. trivalency; catenation
 - ☒ 3. covalency; catenation
 - ☒ 4. tetravalency; catenation

Q.43 In the reactivity series, which of the following metals can displace zinc from the zinc sulphate solution?

- Ans**
- ☒ 1. Aluminium
 - ☐ 2. Copper
 - ☐ 3. Silver
 - ☐ 4. Lead

Q.44 An iron nail is placed in a solution of copper sulphate. Which of the following changes will NOT occur?

- Ans**
- ☐ 1. The blue color of the solution fades.
 - ☐ 2. Iron ions enter the solution.
 - ☒ 3. The solution temperature increases significantly.
 - ☐ 4. A brown layer forms on the iron nail.

Q.45 Compared to non-metals, which of the following is true about coefficient of linear expansion (α_l) of metals?

- Ans**
- ☐ 1. Metals have same value of α_l
 - ☐ 2. Metals have relatively smaller value of α_l
 - ☒ 3. Metals have relatively higher value of α_l
 - ☐ 4. The value of α_l is zero for all metals

Q.46 What type of error is introduced when an observer consistently reads a scale from an angle instead of directly in front?

- Ans**
- ☐ 1. Random error
 - ☐ 2. Instrumental error
 - ☒ 3. Parallax error
 - ☐ 4. Gross error

Q.47 At which of the following temperatures, will water have the maximum density?

- Ans**
- ☐ 1. 10 °C
 - ☒ 2. 0 °C
 - ☐ 3. 16 °C
 - ☐ 4. 4 °C

Q.48 Considering the bond lengths of N_2 and O_2 , which statement is correct?

- Ans**
- ☐ 1. Bond length of N_2 is greater than O_2 .
 - ☒ 2. Bond length of O_2 is greater than N_2 .
 - ☐ 3. Bond lengths of N_2 and O_2 are equal.
 - ☐ 4. Bond length of N_2 is double that of O_2 .

Q.49 When an acid dissolves in water, hydrogen ions (H^+) are released. What happens to them?

- Ans**
- ☐ 1. They remain as free H^+ ions in the solution.
 - ☒ 2. They combine with water molecules to form hydronium ions (H_3O^+).
 - ☐ 3. They form hydrogen gas (H_2).
 - ☐ 4. They combine with hydroxide ions (OH^-) to form neutral molecules.

Q.50 Which of the following statements is/are correct regarding the position of metals in the activity series based on their natural occurrence?

Statement I: Moderately reactive metals are commonly found as oxides, sulphides or carbonates in nature.

Statement II: The metals at the top of the activity series are found in nature as free state.

- Ans**
- ☒ 1. Only Statement II is correct.
 - ☒ 2. Only Statement I is correct.
 - ☒ 3. Neither Statement I nor Statement II is correct.
 - ☒ 4. Both Statement I and Statement II are correct.

Q.51 Which of the following instruments is used to determine the purity of milk based on Archimedes' principle?

- Ans**
- ☒ 1. Thermometer
 - ☒ 2. Lactometer
 - ☒ 3. Barometer
 - ☒ 4. Hydrometer

Q.52 Which of the following internal macroscopic states of the body changes when a bullet is fired from a gun?

- Ans**
- ☒ 1. Heat energy
 - ☒ 2. Temperature
 - ☒ 3. Kinetic energy
 - ☒ 4. Chemical energy

Q.53 The oxides of ____ and ____ metals can be reduced to metals by heating alone in air.

- Ans**
- ☒ 1. Zn; Cu
 - ☒ 2. Hg; Zn
 - ☒ 3. Hg; Mn
 - ☒ 4. Hg; Cu

Q.54 Which of the following are the correct conditions required for total internal reflection to take place?

- (i) The light should be travelling from an optically rarer to an optically denser medium.
- (ii) The light should be travelling from an optically denser to an optically rarer medium.
- (iii) The angle of incidence should be less than the critical angle for a given pair of media.
- (iv) The angle of incidence should be greater than the critical angle for a given pair of media.

- Ans**
- ☒ 1. Both (i) and (iii)
 - ☒ 2. Both (ii) and (iii)
 - ☒ 3. Both (ii) and (iv)
 - ☒ 4. Both (i) and (iv)

Q.55 Identify whether the given statements are true or false.

Statement-I: Henry was the first to give a quantitative relation between the pressure and solubility of a gas in a solvent, which is known as Henry's law.

Statement-II: At a constant temperature, the solubility of a gas in a liquid is directly proportional to the partial pressure of the gas present above the surface of a liquid or solution.

- Ans**
- ☒ 1. Statement-I is true but Statement-II is false.
 - ☒ 2. Both the statements are false.
 - ☒ 3. Statement-I is false but Statement-II is true.
 - ☒ 4. Both the statements are true.

Q.56 A Gaussian spherical surface of radius R enclosing a charge Q , has an outward flux ϕ associated with it. What will be the new outward flux associated with the Gaussian spherical surface, if the radius of the Gaussian surface is doubled?

- Ans**
- ☒ 1. $\phi/2$
 - ☒ 2. $\phi/4$
 - ☒ 3. 2ϕ
 - ☒ 4. ϕ

Q.57 What does a higher value of thermal conductivity of a material signify?

- Ans**
- ☒ 1. The material will conduct heat more rapidly
 - ☒ 2. The material will be highly resistive
 - ☒ 3. The material will not conduct heat
 - ☒ 4. The material will conduct heat more slowly

Q.58 Which of the following statements is/are FALSE regarding the characteristics of sound waves?

- (i) A loud sound wave has a lower amplitude compared to a soft sound wave.
- (ii) A loud sound wave has a greater amplitude compared to a soft sound wave.
- (iii) The frequency of a high-pitched sound is greater than that of a low-pitched sound.
- (iv) The frequency of a high-pitched sound is lower than that of a low-pitched sound.

- Ans**
- ☒ 1. Both (i) and (iv)
 - ☒ 2. Both (i) and (iii)
 - ☒ 3. Both (ii) and (iv)
 - ☒ 4. Both (ii) and (iii)

Q.59 Select the option that is correct regarding the following two statements labelled Assertion (A) and Reason (R).

Assertion: In insulators, the energy gap between the valence band and conduction band is less than 3 eV.

Reason: The valence electrons in an insulator are very loosely bound to the nucleus.

- Ans**
- ☒ 1. Both assertion and reason are false.
 - ☒ 2. Assertion is true but reason is false.
 - ☒ 3. Both assertion and reason are true and reason is the correct explanation of assertion.
 - ☒ 4. Assertion is false but reason is true.

Q.60 What is the significance of the Bohr radius in the Bohr model of the atom?

- Ans**
- ☒ 1. Represents the radius of the highest energy state of the atom
 - ☒ 2. Represents the radius of the nucleus
 - ☒ 3. Represents the radius of the middle orbit in an atom
 - ☒ 4. Represents the radius of the smallest orbit or lowest energy state

Q.61 Why is fullerene considered a unique allotrope of carbon?

- Ans**
- ☒ 1. It is the softest allotrope of carbon.
 - ☒ 2. It is formed only in high-pressure conditions.
 - ☒ 3. It contains a pentagonal and hexagonal carbon arrangement.
 - ☒ 4. It has a two-dimensional structure.

Q.62 Identify whether the given statements are true or false.

Statement-I: When two or more compounds differ in the position of substituent atom or functional group on the carbon skeleton, they are called position isomers.

Statement-II: Propan-1-ol and Propan-2-ol are examples of position isomers.

- Ans**
- ☒ 1. Both the statements are false.
 - ☒ 2. Statement-I is false but Statement-II is true.
 - ☒ 3. Statement-I is true but Statement-II is false.
 - ☒ 4. Both the statements are true.

Q.63 Given below are two statements. Read the statements carefully and select the correct option.

Statement I: Green chemistry is a way of thinking and is about utilising the existing knowledge and principles of chemistry and other sciences to reduce adverse impact on environment.

Statement II: Green chemistry is a production process that would bring about minimum pollution or deterioration of the environment.

- Ans**
- ☒ 1. Both Statements I and II are true.
 - ☒ 2. Statement I is false but Statement II is true.
 - ☒ 3. Statement I is true but Statement II is false.
 - ☒ 4. Both Statements I and II are false.

Q.64 Which of the following is NOT true according to Rutherford's atomic model?

- Ans**
- ☒ 1. The nucleus is surrounded by a cloud of electrons.
 - ☒ 2. Most of the space within the atom is empty.
 - ☒ 3. The total positive charge of the nucleus is greater than the total negative charge of the electrons in the atom.
 - ☒ 4. All the positive charge and mass of an atom are concentrated in a very small region.

Q.65 How does the magnetic field inside a current-carrying solenoid behave?

- Ans**
- ☒ 1. It forms concentric circles around the solenoid.
 - ☒ 2. It is non-uniform and varies in strength.
 - ☒ 3. It consists of parallel straight lines, indicating uniformity.
 - ☒ 4. It disappears when the current is switched on.

Q.66 Which of the following statements is/are true?

- i. Kössel and Lewis in 1916 developed an important theory of chemical combination between atoms known as the electronic theory of chemical bonding.
- ii. According to the electronic theory, atoms can combine either by transfer of valence electrons from one atom to another (gaining or losing) or by sharing of valence electrons in order to have an octet in their valence shells.

- Ans**
- ☒ 1. Only i
 - ☒ 2. Both i and ii
 - ☒ 3. Neither i nor ii
 - ☒ 4. Only ii

Q.67 Which of the following reactions is an example of a combination reaction?

- Ans**
- ☒ 1. $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$
 - ☒ 2. $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
 - ☒ 3. $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}_2$
 - ☒ 4. $\text{NaCl} + \text{AgNO}_3 \rightarrow \text{AgCl} + \text{NaNO}_3$

Q.68 The processes used for removing the gangue from the ore are based on the differences between the _____ or _____ properties of the gangue and the ore.

- Ans**
- ☐ 1. solubility; thermal
 - ☐ 2. magnetic; thermal
 - ☐ 3. chemical; electrical
 - ☒ 4. physical; chemical

Q.69 The present accepted value of the electrical charge on an electron is _____ $\times 10^{-19}$ C.

- Ans**
- ☐ 1. 1.602
 - ☐ 2. 1.6022
 - ☐ 3. 1.6
 - ☒ 4. 1.602176

Q.70 Arrange the following metals according to the order of increasing reactivity.

Ca, Zn, Cu, Au

- Ans**
- ☒ 1. Au < Cu < Zn < Ca
 - ☐ 2. Au < Zn < Cu < Ca
 - ☐ 3. Au < Cu < Ca < Zn
 - ☐ 4. Au < Ca < Zn < Cu

Q.71 Which of the following gives the correct decreasing order of atomic radii of the given elements of second period?

- Ans**
- ☐ 1. B < Be < N < O
 - ☐ 2. Be > B > N > O
 - ☐ 3. Be < B < O < N
 - ☒ 4. Be < B < N < O

Q.72 Considering significant figures, what will be the correctly rounded result of $21.16 + 5.5$?

- Ans**
- ☐ 1. 26.60
 - ☐ 2. 26.00
 - ☐ 3. 26
 - ☒ 4. 26.7

Q.73 Which of the following is NOT refined electrolytically?

- Ans**
- ☐ 1. Zinc
 - ☒ 2. Iron
 - ☐ 3. Copper
 - ☐ 4. Silver


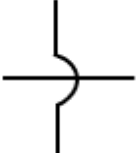


Q.74 Which of the following is the unit of work function (ϕ_0) in photoelectric emission?

- Ans**
- ☐ 1. Volts
 - ☐ 2. Amperes
 - ☒ 3. Electron volt (eV)
 - ☐ 4. Coulomb

Q.75 Which of the following pairs is INCORRECT?

- Ans**
- ☐ 1. BCl_3 - SP^2 hybridisation
 - ☒ 2. H_2O - SP hybridisation
 - ☐ 3. BeCl_2 - SP hybridisation
 - ☐ 4. CH_4 - SP^3 hybridisation

Q.76 What is the symbol of a wire crossing without joining in a circuit?

- Ans
- ☒ 1. 
 - ☒ 2. 
 - ☒ 3. 
 - ☒ 4. 

Q.77 Which gas is released when ethanol is oxidised to ethanoic acid using an oxidising agent?

- Ans
- ☒ 1. Oxygen
 - ☒ 2. No gas is released.
 - ☒ 3. Hydrogen
 - ☒ 4. Carbon dioxide

Q.78 Which method is commonly used to extract copper from copper sulphide (Cu₂S)?

- Ans
- ☒ 1. Roasting in air
 - ☒ 2. Dissolving in acid
 - ☒ 3. Reduction with carbon
 - ☒ 4. Electrolysis

Q.79 Given below are two statements. Read the statements carefully and select the correct option.

Statement I: Bohr's model could account for the stability and line spectra of hydrogen atom and hydrogen like ions (for example, He⁺, Li²⁺, Be³⁺ and so on).

Statement II: Bohr's model could not explain the ability of atoms to form molecules by chemical bonds.

- Ans
- ☒ 1. Statement I is false but Statement II is true.
 - ☒ 2. Statement I is true but Statement II is false.
 - ☒ 3. Both Statements I and II are true.
 - ☒ 4. Both Statements I and II are false.

Q.80 Calculate the time taken by a sound wave of frequency 1 kHz and wavelength of 40 cm to travel a distance of 4 km.

- Ans
- ☒ 1. 10.0 seconds
 - ☒ 2. 2.1 seconds
 - ☒ 3. 1.0 seconds
 - ☒ 4. 21 seconds

Q.81 Which of the following is the correct relation between electric power (P) of an appliance, electrical energy consumed (E) by the appliance and time (t) for which the appliance is used?

- Ans
- ☒ 1. $P = \frac{E^2}{t}$
 - ☒ 2. $P = E^2t$
 - ☒ 3. $P = \frac{E}{t}$
 - ☒ 4. $P = Et$

Q.82 For an insulator at room temperature, the conduction band is _____.

- Ans**
- ☒ 1. partially filled
 - ☒ 2. absent
 - ☒ 3. completely filled
 - ☒ 4. empty

Q.83 The energy of an electron in a multielectron atom depends on which of the following?

- i. Its principal quantum number (shell)
- ii. Its azimuthal quantum number (subshell)

- Ans**
- ☒ 1. ii only
 - ☒ 2. i only
 - ☒ 3. Neither i nor ii
 - ☒ 4. Both i and ii

Q.84 If a nucleon has p number of neighbours within the range of nuclear force, then the binding energy is _____.

- Ans**
- ☒ 1. directly proportional to square of p
 - ☒ 2. inversely proportional to square of p
 - ☒ 3. directly proportional to p
 - ☒ 4. inversely proportional to p

Q.85 Which of the following elements is a solid at room temperature and pressure?

- Ans**
- ☒ 1. Mercury
 - ☒ 2. Sodium
 - ☒ 3. Oxygen
 - ☒ 4. Hydrogen

Q.86 Which device is used to get a constant DC voltage from the DC unregulated output of a rectifier?

- Ans**
- ☒ 1. Zener diode
 - ☒ 2. Rectifier
 - ☒ 3. Forward biased p-n junction
 - ☒ 4. Photo diode

Q.87 The Doppler effect is a phenomenon associated with which of the following?

- Ans**
- ☒ 1. Wave motion
 - ☒ 2. Thermal conduction
 - ☒ 3. Particle motion
 - ☒ 4. Electrostatic force

Q.88 Which of the following relationship holds in regards to energy gap in Conductor (E_{gC}), insulator (E_{gi}) and semiconductor (E_{gS})?

- Ans**
- ☒ 1. $E_{gS} < E_{gC} < E_{gi}$
 - ☒ 2. $E_{gi} < E_{gS} < E_{gC}$
 - ☒ 3. $E_{gi} < E_{gC} < E_{gS}$
 - ☒ 4. $E_{gC} < E_{gS} < E_{gi}$

Q.89 Which of the following correctly describes the trend of ionic radius across a period?

- Ans**
- ☒ 1. Cations decrease in size and anions increase in size across a period.
 - ☒ 2. Ionic radius increases from left to right across a period.
 - ☒ 3. Ionic radius increases uniformly across a period.
 - ☒ 4. Ionic radius remains the same for all elements in a period.

Q.90 An electric lamp of resistance $20\ \Omega$, and a conductor of $4\ \Omega$ resistance are connected in series in an electric circuit. What will be the resultant resistance of the circuit?

- Ans**
- ☐ 1. $1.25\ \Omega$
 - ☐ 2. $0.8\ \Omega$
 - ☐ 3. $8\ \Omega$
 - ☒ 4. $24\ \Omega$

Q.91 The gravitational force between two bodies of the same mass placed at a distance 'd' apart is 'X'. If the mass of both bodies is doubled, and the distance between them is reduced to $d/4$, what will be the new gravitational force in terms of X?

- Ans**
- ☐ 1. $16X$
 - ☐ 2. $X/64$
 - ☒ 3. $64X$
 - ☐ 4. $X/16$

Q.92 Temperature is considered as a/an _____ variable while specifying the state of a gas in thermodynamics.

- Ans**
- ☐ 1. non-important
 - ☐ 2. microscopic
 - ☒ 3. macroscopic
 - ☐ 4. undefined

Q.93 Charles' Law states that for a fixed mass of gas at constant pressure, the volume of a gas is:

- Ans**
- ☐ 1. inversely proportional to the temperature in celsius
 - ☐ 2. directly proportional to the temperature in celsius
 - ☐ 3. inversely proportional to the temperature in kelvin
 - ☒ 4. directly proportional to the temperature in kelvin

Q.94 During the electrolytic refining of copper, which of the following observations is correct?

- Ans**
- ☐ 1. Impurities from crude copper move to the cathode along with pure copper.
 - ☐ 2. Pure copper is deposited at the anode, and impurities settle as anode mud.
 - ☒ 3. The anode dissolves, and pure copper is deposited at the cathode.
 - ☐ 4. The electrolyte is a neutral solution that does not participate in the refining process.

Q.95 Why did Bohr's model fail for multi-electron atoms?

- Ans**
- ☐ 1. It assumed electrons are positively charged.
 - ☒ 2. It did not consider electron-electron interactions.
 - ☐ 3. It was based on classical physics only.
 - ☐ 4. It ignored the nucleus of the atom.

Q.96 Which of the following is NOT a unit used to measure the binding energy of a nucleus?

- Ans**
- ☐ 1. Electron volt (eV)
 - ☒ 2. Atomic mass unit (amu)
 - ☐ 3. Joule (J)
 - ☐ 4. Million electron volt (MeV)

Q.97 Mixing an acid or base with water results in decrease in the concentration of ions ($\text{H}_3\text{O}^+/\text{OH}^-$) per unit volume. Such a process is called _____.

- Ans**
- ☐ 1. dissociation
 - ☐ 2. decomposition
 - ☒ 3. dilution
 - ☐ 4. dissolution

Q.98 What is the main function of the ozone in the stratosphere?

- Ans**
- ☐ 1. It absorbs excess carbon dioxide.
 - ☒ 2. It protects living organisms from harmful UV radiation.
 - ☐ 3. It prevents strong winds from reaching the earth.
 - ☐ 4. It reduces the temperature of the atmosphere.

Q.99 Applying a layer of paint on an iron surface helps prevent corrosion primarily by:

- Ans**
- ☐ 1. increasing the strength of iron
 - ☒ 2. preventing exposure to air and moisture
 - ☐ 3. reacting with iron
 - ☐ 4. absorbing oxygen

Q.100 Which of the following is equivalent to the energy of $1.602 \times 10^{-20} \text{ J}$?

- Ans**
- ☐ 1. 1 eV
 - ☐ 2. 0.5 eV
 - ☒ 3. 0.1 eV
 - ☐ 4. 10 eV