NEST Chemistry Sample Paper – 8

Duration: 45 Minutes **Maximum Marks: 60**

Instructions

- This paper contains **20 Multiple Choice Questions (single correct answer)**, modelled on the Chemistry section of **NEST 2026**.
- Each correct answer carries **+3 marks**. There is a deduction of -1 **mark** for each incorrect answer; **no marks** are deducted for an unattempted question.
- Every question has exactly **four options**, of which only **one** is correct. Choose carefully.
- Personal calculators, log tables, mobile phones, and other electronic gadgets are strictly prohibited in the examination hall.
- A simple on-screen (virtual) calculator is provided in the computer-based test interface and may be used; blank sheets for rough work are supplied at the exam centre.

Q1. 250 mL of a 0.40 M $NaCl$ solution is mixed with 150 mL of a 0.20 M $NaCl$ solution. Assuming volumes are additive, the molarity of $NaCl$ in the final solution is

(A) 0.20 M

(B) 0.40 M

(C) 0.325 M

(D) 0.60 M

Q2. For an electron in the $4d$ orbital of a hydrogen-like atom, the number of radial nodes and angular nodes respectively are (radial nodes $= n-l-1$; angular nodes $= l$)

(A) 1 and 2

(B) 2 and 1

(C) 3 and 1

(D) 0 and 3

Q3. An element X is a third-period element. It forms an amphoteric oxide X_2O_3, its most common ion carries a $+3$ charge, and it is the most abundant metal in the Earth's crust. The element X is

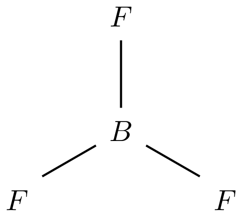
(A) Mg

(B) Si

(C) Na

(D) Al

Q4. The molecule BF_3 has no lone pair on the central boron atom, as shown below. According to VSEPR theory, the molecular geometry of BF_3 is



(A) bent

(B) trigonal planar

(C) tetrahedral

(D) linear

Q5. For a process, ΔH is negative and ΔS is positive. Using $\Delta G = \Delta H - T\Delta S$, this process is

(A) spontaneous at all temperatures

(B) non-spontaneous at all temperatures

(C) spontaneous only at high temperature

(D) spontaneous only at low temperature

Q6. A strong base $NaOH$ is dissolved in water to give a 0.01 M solution at 298 K. Taking $K_w = 10^{-14}$, the pH of this solution is

(A) 2

(B) 7

(C) 12

(D) 10

Q7. Consider the unbalanced reaction in acidic medium:

$$MnO_4^- + Fe^{2+} + H^+ \rightarrow Mn^{2+} + Fe^{3+} + H_2O.$$

When this equation is balanced with the smallest whole-number coefficients, the coefficient of H^+ is

(A) 4

(B) 5

(C) 16

(D) 8

Q8. The average translational kinetic energy of one mole of an ideal gas is given by $\overline{KE} = \frac{3}{2}RT$. If the absolute temperature of the gas is doubled, the average translational kinetic energy of the sample

(A) remains unchanged

(B) becomes twice the original value

(C) becomes four times the original value

(D) becomes half the original value

Q9. An ideal solution is prepared by mixing 2 mol of liquid A and 3 mol of liquid B. The pure-component vapour pressures at the given temperature are $P_A^\circ = 120$ mm Hg and $P_B^\circ = 80$ mm Hg. The total vapour pressure of the solution (Raoult's law) is

(A) 96 mm Hg

(B) 100 mm Hg

(C) 200 mm Hg

(D) 104 mm Hg

Q10. For the galvanic cell represented as

$$Mg(s)\,|\,Mg^{2+}(aq)\,||\,Ag^{+}(aq)\,|\,Ag(s),$$

which statement is correct about the electrodes (by IUPAC convention)?

(A) Ag is the anode where oxidation occurs

(B) Both electrodes undergo reduction

(C) Mg is the anode (oxidation) and Ag is the cathode (reduction)

(D) Mg is the cathode where reduction occurs

Q11. For the gas-phase reaction $N_2+3H_2 \rightarrow 2NH_3$, if the rate of disappearance of H_2 is 0.030 mol L^{-1} s^{-1}, the rate of formation of NH_3 is

(A) 0.030 mol L^{-1} s^{-1}

(B) 0.020 mol L^{-1} s^{-1}

(C) 0.045 mol L^{-1} s^{-1}

(D) 0.010 mol L^{-1} s^{-1}

Q12. Among the following $3d$-series ions, which one has the maximum number of unpaired electrons in its ground state?

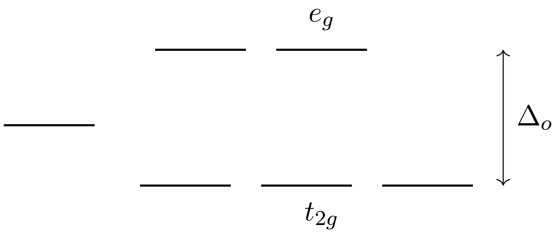
(A) Ti^{2+} $(Z_{Ti} = 22)$

(B) Ni^{2+} $(Z_{Ni} = 28)$

(C) Co^{2+} $(Z_{Co} = 27)$

(D) Mn^{2+} $(Z_{Mn} = 25)$

Q13. The crystal-field splitting of d orbitals in an octahedral field is shown below. Using the spectrochemical series, which of the following ligands produces the *largest* splitting Δ_o (strongest field)?



(A) Cl^-

(B) CN^-

(C) H_2O

(D) F^-

Q14. Three carbocations are shown below. Using inductive and hyperconjugative effects, the correct order of their stability (most stable first) is

$$\underset{\text{(I)}}{CH_3^+} \qquad \underset{\text{(II)}}{CH_3\text{-}\overset{+}{C}H\text{-}CH_3} \qquad \underset{\text{(III)}}{(CH_3)_3C^+}$$

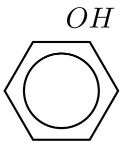
(A) (I) $>$ (II) $>$ (III)

(B) (II) $>$ (III) $>$ (I)

(C) (III) $>$ (II) $>$ (I)

(D) (I) $>$ (III) $>$ (II)

Q15. In the electrophilic aromatic substitution of the compound shown below, the $-OH$ group is an activating, ortho/para-directing substituent. The incoming electrophile E^+ will preferentially attack at positions



(A) ortho and para to the $-OH$ group

(B) meta to the $-OH$ group only

(C) only at the carbon bearing $-OH$

(D) para to the $-OH$ group only

Q16. Haloarenes such as chlorobenzene are much less reactive towards nucleophilic substitution than haloalkanes. The principal reason is

(A) the $C{-}Cl$ bond in chlorobenzene is purely ionic

(B) chlorine in chlorobenzene carries a full positive charge

(C) benzene rings cannot accommodate any nucleophile

(D) partial double-bond character (resonance) shortens and strengthens the $C{-}Cl$ bond, and the ring carbon is sp^2

Q17. Consider the four compounds: ethanol, water, phenol and acetic acid. The correct order of acidic strength (most acidic first) is

(A) ethanol $>$ water $>$ phenol $>$ acetic acid

(B) acetic acid $>$ phenol $>$ water $>$ ethanol

(C) phenol $>$ acetic acid $>$ ethanol $>$ water

(D) water $>$ ethanol $>$ acetic acid $>$ phenol

Q18. The iodoform test ($I_2/NaOH$) is positive for compounds containing a CH_3CO- group or a $CH_3CH(OH)-$ group. Among the compounds shown, which gives a *positive* iodoform test?

CH_3CHO	C_2H_5OH	$CH_3COCH_2CH_3$	$HCHO$
(W)	(X)	(Y)	(Z)

(A) only (Z)

(B) only (W)

(C) (W), (X) and (Y)

(D) only (Y)

Q19. Consider aniline ($C_6H_5NH_2$), p-toluidine (p-CH_3-$C_6H_4NH_2$) and p-nitroaniline (p-NO_2-$C_6H_4NH_2$). The correct order of basicity (most basic first) is

(A) p-nitroaniline $>$ aniline $>$ p-toluidine

(B) aniline $>$ p-toluidine $>$ p-nitroaniline

(C) p-nitroaniline $>$ p-toluidine $>$ aniline

(D) p-toluidine $>$ aniline $>$ p-nitroaniline

Q20. Amino acids that the human body cannot synthesize and must obtain from the diet are called *essential* amino acids. Which of the following is an *essential* amino acid?

(A) Leucine

(B) Glycine

(C) Alanine

(D) Serine

Detailed Solutions

Q1.

Solution

Concept — Mixing solutions of the same solute: Total moles of solute are conserved; the final molarity is total moles divided by total volume.

Step 1 — Moles from each part: $n_1 = 0.40 \times 0.250 = 0.100$ mol; $n_2 = 0.20 \times 0.150 = 0.030$ mol. Total $= 0.130$ mol.

Step 2 — Final volume and molarity: Total volume $= 250 + 150 = 400$ mL $= 0.400$ L. $M = \dfrac{0.130}{0.400} = 0.325$ M.

Why other options are wrong:

- (A) 0.20 M is just the dilute stock value.
- (B) 0.40 M is just the concentrated stock value.
- (D) 0.60 M wrongly adds the two molarities.

Final Answer: 0.325 M $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Nodes in an orbital: For an orbital with principal quantum number n and azimuthal quantum number l: radial nodes $= n - l - 1$ and angular nodes $= l$.

Step 1 — Identify n and l: For a $4d$ orbital, $n = 4$ and $l = 2$ (d sub-shell).

Step 2 — Compute nodes: Radial nodes $= 4 - 2 - 1 = 1$; angular nodes $= l = 2$.

Why other options are wrong:

- (B) 2 and 1 swaps the two counts.
- (C) 3 and 1 uses $l = 1$ (a p orbital).
- (D) 0 and 3 uses $l = 3$ (an f orbital).

Final Answer: 1 radial and 2 angular nodes $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q2

Q3.

Solution

Concept — Identifying an element from periodic clues: Combine the clues (period, oxide nature, common oxidation state, abundance) to pin down the element.

Step 1 — Use the clues: A third-period element forming an amphoteric X_2O_3 with a $+3$ ion that is the most abundant metal in the crust points to aluminium (Al_2O_3 is amphoteric; Al^{3+} is the common ion).

Step 2 — Confirm: Al ($[Ne]3s^23p^1$) loses three electrons to give Al^{3+} and is indeed the most abundant metal in the Earth's crust.

Why other options are wrong:

- (A) Mg forms a basic oxide MgO and the $+2$ ion.
- (B) Si is a metalloid forming acidic SiO_2 with a $+4$ state.
- (C) Na forms a strongly basic oxide and the $+1$ ion.

Final Answer: $Al \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q3

Q4.

Solution

Concept — VSEPR geometry: The steric number (bond pairs + lone pairs) fixes the electron geometry; with no lone pairs the molecular shape equals the electron geometry.

Step 1 — Steric number of BF_3: Boron has 3 bond pairs and 0 lone pairs, so steric number $= 3$.

Step 2 — Shape: Three bonding regions with no lone pair give a trigonal planar shape (sp^2, bond angles $120°$).

Why other options are wrong:

- (A) bent arises with steric number 3 but one lone pair (e.g. SO_2).
- (C) tetrahedral is steric number 4 (e.g. CH_4).
- (D) linear is steric number 2 (e.g. CO_2).

Final Answer: trigonal planar $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q4

Q5.

Solution

Concept — Spontaneity and Gibbs energy: A process is spontaneous when $\Delta G = \Delta H - T\Delta S < 0$.

Step 1 — Substitute the signs: With $\Delta H < 0$ (negative) and $\Delta S > 0$ (positive), the term $-T\Delta S$ is also negative for all $T > 0$.

Step 2 — Conclusion: $\Delta G = \text{(negative)} - (T)\text{(positive)} = \text{negative}$ at every temperature. So the process is spontaneous at all temperatures.

Why other options are wrong:

- (B) describes $\Delta H > 0,\ \Delta S < 0$.
- (C) describes $\Delta H > 0,\ \Delta S > 0$.
- (D) describes $\Delta H < 0,\ \Delta S < 0$.

Final Answer: spontaneous at all temperatures $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q5

Q6.

Solution

Concept — pH of a strong base: A strong base dissociates fully, so $[OH^-]$ equals its molarity; then $pOH = -\log[OH^-]$ and $pH = 14 - pOH$.

Step 1 — Find pOH: $[OH^-] = 0.01 = 10^{-2}$ M, so $pOH = -\log(10^{-2}) = 2$.

Step 2 — Find pH: $pH = 14 - pOH = 14 - 2 = 12$.

Why other options are wrong:

- (A) 2 is the pOH, not the pH.
- (B) 7 is neutral water.
- (D) 10 would correspond to $pOH = 4$ (10^{-4} M base).

Final Answer: $pH = 12 \Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q6

Q7.

Solution

Concept — Balancing redox in acidic medium: Balance the electron transfer between the oxidant and reductant, then balance O with H_2O and H with H^+.

Step 1 — Electron balance: Mn goes $+7 \to +2$ (gain $5e^-$); Fe goes $+2 \to +3$ (lose $1e^-$). So $1\,MnO_4^-$ reacts with $5\,Fe^{2+}$.

Step 2 — Balanced equation:

$$MnO_4^- + 5Fe^{2+} + 8H^+ \to Mn^{2+} + 5Fe^{3+} + 4H_2O.$$

The coefficient of H^+ is 8.

Why other options are wrong:

- (A) 4 is the coefficient of H_2O, not H^+.
- (B) 5 is the coefficient of Fe.
- (C) 16 doubles the correct value.

Final Answer: coefficient of H^+ is $8 \Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q7

Q8.

Solution

Concept — Kinetic energy and temperature: The average translational kinetic energy of a gas depends only on absolute temperature: $\overline{KE} = \frac{3}{2}RT$ per mole. It is directly proportional to T.

Step 1 — Proportionality: Since $\overline{KE} \propto T$, doubling T doubles $\overline{KE}$.

Step 2 — Result: New kinetic energy $= \frac{3}{2}R(2T) = 2 \times \frac{3}{2}RT$, i.e. twice the original.

Why other options are wrong:

- (A) it cannot stay constant when T changes.
- (C) four times would require $\overline{KE} \propto T^2$, which is wrong.
- (D) half would require lowering T, not doubling it.

Final Answer: becomes twice the original $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q8

Q9.

Solution

Concept — Raoult's law for ideal solutions: Total vapour pressure $= x_A P_A^\circ + x_B P_B^\circ$, where the x are mole fractions.

Step 1 — Mole fractions: $x_A = \dfrac{2}{5} = 0.4$; $x_B = \dfrac{3}{5} = 0.6$.

Step 2 — Total pressure: $P = 0.4 \times 120 + 0.6 \times 80 = 48 + 48 = 96$ mm Hg.

Why other options are wrong:

- (B) 100 mm Hg is the simple average of the two pure values.
- (C) 200 mm Hg adds the two pure vapour pressures.
- (D) 104 mm Hg swaps the mole fractions.

Final Answer: 96 mm Hg $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q9

Q10.

Solution

Concept — Cell notation convention: By IUPAC convention the species on the left of the cell diagram is the anode (oxidation) and the species on the right is the cathode (reduction).

Step 1 — Read the diagram: $Mg(s)\,|\,Mg^{2+}$ is written on the left, so Mg is oxidized: $Mg \rightarrow Mg^{2+} + 2e^-$ (anode).

Step 2 — Right electrode: $Ag^+\,|\,Ag$ is on the right, so Ag^+ is reduced: $Ag^+ + e^- \rightarrow Ag$ (cathode).

Why other options are wrong:

- (A) reverses the roles; Ag is the cathode, not the anode.
- (B) a cell has one oxidation and one reduction, not two reductions.
- (D) Mg is oxidized, not reduced.

Final Answer: Mg anode, Ag cathode $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q10

Q11.

Solution

Concept — Rate in terms of stoichiometry: For $N_2 + 3H_2 \rightarrow 2NH_3$, the unique rate is $-\frac{d[N_2]}{dt} = -\frac{1}{3}\frac{d[H_2]}{dt} = +\frac{1}{2}\frac{d[NH_3]}{dt}$.

Step 1 — Relate H_2 and NH_3: $-\frac{1}{3}\frac{d[H_2]}{dt} = +\frac{1}{2}\frac{d[NH_3]}{dt}$, so $\frac{d[NH_3]}{dt} = \frac{2}{3}\left(-\frac{d[H_2]}{dt}\right)$.

Step 2 — Substitute: $\frac{d[NH_3]}{dt} = \frac{2}{3} \times 0.030 = 0.020 \text{ mol L}^{-1} \text{ s}^{-1}$.

Why other options are wrong:

- (A) 0.030 ignores the stoichiometric factor.
- (C) 0.045 uses the factor $\frac{3}{2}$ inverted.
- (D) 0.010 uses a factor of $\frac{1}{3}$.

Final Answer: $0.020 \text{ mol L}^{-1} \text{ s}^{-1} \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q11

Q12.

Solution

Concept — Counting unpaired electrons: Write the $3d$ configuration of each ion (remove $4s$ first, then $3d$) and apply Hund's rule.

Step 1 — Configurations: $Ti^{2+} = 3d^2$ (2 unpaired); $Ni^{2+} = 3d^8$ (2 unpaired); $Co^{2+} = 3d^7$ (3 unpaired); $Mn^{2+} = 3d^5$ (5 unpaired, all singly occupied).

Step 2 — Maximum: Mn^{2+} ($3d^5$) has the maximum, 5 unpaired electrons.

Why other options are wrong:

- (A) Ti^{2+} has only 2 unpaired.
- (B) Ni^{2+} has only 2 unpaired.
- (C) Co^{2+} has 3 unpaired, fewer than Mn^{2+}.

Final Answer: Mn^{2+} (5 unpaired) $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q12

Q13.

Solution

Concept — Spectrochemical series: Ligands are ordered by the field strength (size of Δ_o) they produce. A partial order is $I^- < Br^- < Cl^- < F^- < H_2O < NH_3 < CN^- < CO$.

Step 1 — Compare the options: Among Cl^-, CN^-, H_2O and F^-, the strongest-field ligand is CN^- (it lies far to the right of the series).

Step 2 — Conclusion: CN^- produces the largest splitting Δ_o.

Why other options are wrong:

- (A) Cl^- is a weak-field ligand (small Δ_o).
- (C) H_2O is intermediate, weaker than CN^-.
- (D) F^- is a weak-field ligand.

Final Answer: $CN^- \Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — Carbocation stability: Stability increases with the number of alkyl groups attached to the positive carbon, owing to electron-donating $+I$ effects and hyperconjugation: tertiary $>$ secondary $>$ primary $>$ methyl.

Step 1 — Classify the cations: (I) CH_3^+ is the methyl cation; (II) is secondary (2 alkyl groups); (III) is tertiary (3 alkyl groups).

Step 2 — Order: (III) tertiary $>$ (II) secondary $>$ (I) methyl.

Why other options are wrong:

- (A) reverses the trend, placing methyl most stable.
- (B) puts tertiary above secondary but misplaces them relative to methyl ordering.
- (D) wrongly places methyl above secondary.

Final Answer: (III) $>$ (II) $>$ (I) $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q14

Q15.

Solution

Concept — Directing effect in EAS: $-OH$ is a strong activating group that donates electron density by resonance, building up negative charge at the ortho and para positions, so the electrophile attacks there.

Step 1 — Identify the directing nature: $-OH$ is ortho/para-directing and activating (ring-activating lone pair on oxygen).

Step 2 — Site of attack: E^+ adds at the ortho and para positions relative to $-OH$.

Why other options are wrong:

- (B) meta direction is characteristic of deactivating groups (e.g. $-NO_2$).
- (C) the substituted carbon (ipso) is not the usual site.
- (D) para alone is incomplete; ortho is also favoured.

Final Answer: ortho and para to $-OH \Rightarrow \boxed{\text{A}}$

Answer: (A) **Go Back to Q15**

Q16.

Solution

Concept — Low reactivity of haloarenes: In chlorobenzene, the lone pair on chlorine delocalizes into the ring, giving the $C-Cl$ bond partial double-bond character. This shortens and strengthens the bond, and the ring carbon is sp^2 (more electronegative), so the bond is harder to break.

Step 1 — Resonance: Resonance structures place a partial double bond between C and Cl, so the bond is stronger than a normal single $C-Cl$ bond.

Step 2 — Consequence: Nucleophilic substitution is difficult under ordinary conditions; it needs harsh conditions (high temperature/pressure) or activating electron-withdrawing groups.

Why other options are wrong:

- (A) the bond is covalent, not ionic.
- (B) chlorine does not bear a full positive charge.
- (C) nucleophiles can react, just not easily; the ring does not exclude them.

Final Answer: partial double-bond character strengthens $C-Cl \Rightarrow \boxed{\text{D}}$

$\boxed{\text{Answer: (D)}}$ Go Back to Q16

Q17.

Solution

Concept — Relative acidity: Acidity depends on the stability of the conjugate base. Carboxylate (resonance over two equivalent oxygens) $>$ phenoxide (resonance into ring) $>$ hydroxide from water $>$ alkoxide from alcohol.

Step 1 — Rank conjugate-base stability: Acetic acid gives the most stabilized anion (carboxylate); phenol gives the resonance-stabilized phenoxide; water is more acidic than ethanol because the $-C_2H_5$ group is electron-donating and destabilizes the alkoxide.

Step 2 — Order: acetic acid $>$ phenol $>$ water $>$ ethanol.

Why other options are wrong:

- (A) reverses the trend, placing ethanol most acidic.
- (C) wrongly places phenol above acetic acid.
- (D) places water and ethanol above the carboxylic acid.

Final Answer: acetic acid $>$ phenol $>$ water $>$ ethanol $\Rightarrow \boxed{\text{B}}$

$\boxed{\text{Answer: (B)}}$ Go Back to Q17

Q18.

Solution

Concept — Iodoform test: A positive iodoform test is given by compounds containing a CH_3CO- (methyl ketone) group or a $CH_3CH(OH)-$ group that can be oxidized to it (also acetaldehyde and ethanol).

Step 1 — Examine each compound: (W) CH_3CHO has the CH_3CO- unit (positive); (X) C_2H_5OH is $CH_3CH(OH)-$ (oxidized to acetaldehyde, positive); (Y) $CH_3COCH_2CH_3$ is a methyl ketone CH_3CO- (positive).

Step 2 — The exception: (Z) $HCHO$ has no CH_3CO- or $CH_3CH(OH)-$ group, so it is negative.

Why other options are wrong:

- (A) only (Z) is exactly the compound that fails the test.
- (B) (W) alone ignores (X) and (Y), which also pass.

- (D) (Y) alone ignores (W) and (X).

Final Answer: (W), (X) and (Y) give positive iodoform $\Rightarrow \boxed{\text{C}}$

Answer: (C) Go Back to Q18

Q19.

Solution

Concept — Basicity of substituted anilines: A ring electron-donating group $(-CH_3)$ raises the electron density on nitrogen and increases basicity; an electron-withdrawing group $(-NO_2)$ lowers it and decreases basicity.

Step 1 — Compare substituents: p-toluidine $(-CH_3,\ +I/+R)$ is more basic than aniline; p-nitroaniline $(-NO_2$, strong $-R/-I)$ is least basic.

Step 2 — Order: p-toluidine $>$ aniline $>$ p-nitroaniline.

Why other options are wrong:

- (A) and (C) wrongly place the nitro compound most basic.
- (B) puts aniline above p-toluidine, ignoring the donating $-CH_3$.

Final Answer: p-toluidine $>$ aniline $>$ p-nitroaniline $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q19

Q20.

Solution

Concept — Essential vs non-essential amino acids: Essential amino acids cannot be synthesized by the human body and must come from the diet; non-essential ones can be made by the body.

Step 1 — Classify the options: Leucine is an essential amino acid. Glycine, alanine and serine are all non-essential (the body can synthesize them).

Step 2 — Conclusion: Among the four, leucine is the essential amino acid.

Why other options are wrong:

- (B) Glycine is non-essential.
- (C) Alanine is non-essential.
- (D) Serine is non-essential.

Final Answer: Leucine $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q20

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	A	3	D	4	B	5	A
6	C	7	D	8	B	9	A	10	C
11	B	12	D	13	B	14	C	15	A
16	D	17	B	18	C	19	D	20	A