**DOs:**
1. Check whether the CET No. has been entered and shaded in the respective circles on the OMR answer sheet.
2. This Question Booklet is issued to you by the invigilator after the 2nd Bell i.e., after 2.30 p.m.
3. The Serial Number of this question booklet should be entered on the OMR answer sheet.
4. The Version Code of this question booklet should be entered on the OMR answer sheet and the respective circles should also be shaded completely.
5. Compulsorily sign at the bottom portion of the OMR answer sheet in the space provided.

**DON'TS:**
1. THE TIMING AND MARKS PRINTED ON THE OMR ANSWER SHEET SHOULD NOT BE DAMAGED / MUTILATED / SPOILED.
2. The 3rd Bell rings at 2.40 p.m., till then;
   - Do not remove the paper seal present on the right hand side of this question booklet.
   - Do not open the question booklet.
   - Do not start answering on the OMR answer sheet.

**IMPORTANT INSTRUCTIONS TO CANDIDATES**

1. This question booklet contains 60 questions and each question will have one statement and four distracters. (Four different options / choices.)
2. After the 3rd Bell is rung at 2.40 p.m., remove the paper seal on the right hand side of this question booklet and check that this booklet does not have any unprinted or torn or missing pages or items etc., if so, get it replaced by a complete test booklet. Read each item and start answering on the OMR answer sheet.
3. During the subsequent 70 minutes:
   - Read each question carefully.
   - Choose the correct answer from out of the four available distracters (options / choices) given under each question / statement.
   - Completely darken / shade the relevant circle with a BLUE OR BLACK INK BALL POINT PEN against the question number on the OMR answer sheet.

**Correct Method of shading the circle on the OMR answer sheet is as shown below:**

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1 2 3 4
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4. Please note that even a minute unintended ink dot on the OMR answer sheet will also be recognised and recorded by the scanner. Therefore, avoid multiple markings of any kind on the OMR answer sheet.
5. Use the space provided on each page of the question booklet for Rough Work. Do not use the OMR answer sheet for the same.
6. After the last bell is rung at 3.50 p.m., stop writing on the OMR answer sheet and affix your LEFT HAND THUMB IMPRESSION on the OMR answer sheet as per the instructions.
7. Hand over the OMR ANSWER SHEET to the room invigilator as it is.
8. After separating the top sheet (Our Copy), the invigilator will return the bottom sheet replica (Candidate’s copy) to you to carry home for self-evaluation.
9. Preserve the replica of the OMR answer sheet for a minimum period of ONE year.

C

[Turn Over
1. The process of zone refining is used in the purification of
   (1) Al  (2) Ge
   (3) Cu  (4) Ag

2. The number of water molecules present in a drop of water weighing 0.018 gm is
   (1) $6.022 \times 10^{26}$  (2) $6.022 \times 10^{23}$
   (3) $6.022 \times 10^{19}$  (4) $6.022 \times 10^{20}$

3. Empirical formula of a compound is CH₂O and its molecular mass is 90, the molecular formula of the compound is
   (1) C₃H₆O₃  (2) C₂H₄O₂
   (3) C₆H₁₂O₆  (4) CH₂O

4. Hybridised states of carbon in Graphite and Diamond are respectively
   (1) sp³, sp³  (2) sp³, sp²
   (3) sp², sp²  (4) sp², sp³

5. The mass of 112 cm³ of NH₃ gas at STP is
   (1) 0.085 g  (2) 0.850 g
   (3) 8.500 g  (4) 80.500 g

Space For Rough Work
6. IUPAC name of \( \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH} - \text{CH}_3 \) is
\[
\text{OH} \quad \text{COOH}
\]
(1) 4-hydroxy 1 methyl pentanoic acid
(2) 4-hydroxy 2 methyl pentanoic acid
(3) 2-hydroxy 4 methyl pentanoic acid
(4) 2-hydroxy 2 methyl pentanoic acid

7. Alkali metals have negative reduction potential and hence they behave as

(1) Oxidising agents (2) Lewis bases
(3) Reducing agents (4) Electrolytes

8. Which of the following gases has the highest value of RMS-velocity at 298 K?

(1) \( \text{CH}_4 \) (2) \( \text{CO} \)
(3) \( \text{Cl}_2 \) (4) \( \text{CO}_2 \)

9. Cycloalkane formed when 1, 4-dibromopentane is heated with Sodium is

(1) Methyl cyclobutane (2) Cyclopentane
(3) Cyclobutane (4) Methyl cyclopentane

Space For Rough Work
10. In the reaction, \(2\text{FeSO}_4 + \text{H}_2\text{SO}_4 + \text{H}_2\text{O}_2 \rightarrow \text{Fe}_2(\text{SO}_4)_3 + 2\text{H}_2\text{O}\), the oxidizing agent is

(1) \(\text{FeSO}_4\)  
(2) \(\text{H}_2\text{SO}_4\)  
(3) \(\text{H}_2\text{O}_2\)  
(4) Both \(\text{H}_2\text{SO}_4\) and \(\text{H}_2\text{O}_2\)

11. Given Thermochemical equation, \(2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l}); \Delta H = -571.6 \text{ kJ}\). Heat of decomposition of water is

(1) \(-571.6 \text{ kJ}\)  
(2) \(+571.6 \text{ kJ}\)  
(3) \(-1143.2 \text{ kJ}\)  
(4) \(+285.8 \text{ kJ}\)

12. In Buna-S, the symbol ‘Bu’ stands for

(1) 1-Butene  
(2) n-Butene  
(3) 2-Butene  
(4) Butadiene

13. The electronic configuration of \(\text{Cu}^{2+}\) ion is

(1) \([\text{Ar}] 3d^8 4s^1\)  
(2) \([\text{Ar}] 3d^9 4s^0\)  
(3) \([\text{Ar}] 3d^7 4s^2\)  
(4) \([\text{Ar}] 3d^8 4s^0\)

Space For Rough Work
14. The yield of the products in the reaction, $A_2(g) + 2B(g) \rightleftharpoons C(g) + Q \text{ kJ}$ would be higher at

(1) High temperature and high pressure
(2) High temperature and low pressure
(3) Low temperature and high pressure
(4) Low temperature and low pressure

15. Mesomeric effect involves

(1) delocalisation of $\pi$-electrons
(2) delocalisation of $\sigma$-electrons
(3) partial displacement of electrons
(4) delocalisation of $\pi$ and $\sigma$ electrons

16. Which one of the following sets of ions represents the collection of isoelectronic species?

(1) $K^+, Cl^-, Mg^{2+}, Sc^{3+}$
(2) $Na^+, Ca^{2+}, Sc^{3+}, F^-$
(3) $K^+, Ca^{2+}, Sc^{3+}, Cl^-$
(4) $Na^+, Mg^{2+}, Al^{3+}, Cl^-$

17. Adsorption theory is applicable for

(1) Homogeneous catalysis
(2) Heterogeneous catalysis
(3) Autocatalysis
(4) Induced catalysis

Space For Rough Work
18. Methane can be converted into Ethane by the reactions

(1) Chlorination followed by the reaction with alcoholic KOH.
(2) Chlorination followed by the reaction with aqueous KOH.
(3) Chlorination followed by Wurtz reaction.
(4) Chlorination followed by decarboxylation.

19. Intramolecular Hydrogen bonding is formed in

(1) H₂O  (2) Salicylaldehyde
(3) NH₃  (4) Benzophenone

20. If 50% of the reactant is converted into a product in a first order reaction in 25 minutes, how much of it would react in 100 minutes?

(1) 93.75%  (2) 87.5%
(3) 75%  (4) 100%

21. The number of optical isomers of the compound CH₃ – CHBr – CHBr – COOH is

(1) 0  (2) 1
(3) 3  (4) 4

Space For Rough Work
22. When limestone is heated, CO$_2$ is given off. The metallurgical operation is

(1) Smelting                  (2) Reduction
(3) Calcination               (4) Roasting

23. The rate of reaction increases with rise in temperature because of

(1) increase in number of activated molecules.
(2) increase in energy of activation.
(3) decrease in energy of activation.
(4) increase in the number of effective collisions.

24. Meso compounds do not show optical activity because

(1) they do not contain chiral carbon atoms.
(2) they have non-super imposable mirror images.
(3) they contain plane of symmetry.
(4) they do not contain plane of symmetry.

25. When formic acid is heated with concentrated H$_2$SO$_4$, the gas evolved is

(1) only CO$_2$                  (2) only ‘CO’
(3) a mixture of ‘CO’ and ‘CO$_2$’ (4) a mixture of ‘SO$_2$’ and ‘CO$_2$’

Space For Rough Work
26. Temperature coefficient of a reaction is ‘2’. When temperature is increased from 30 °C to 90 °C, the rate of reaction is increased by

(1) 60 times  
(2) 64 times  
(3) 150 times  
(4) 400 times

27. Conversion of benzene to acetophenone can be brought by

(1) Wurtz reaction  
(2) Wurtz-Fittig’s reaction  
(3) Friedel Crafts alkylation  
(4) Friedel Crafts acylation

28. Excess of PCl₅ reacts with concentrated H₂SO₄ giving

(1) Chlorosulphuric acid  
(2) Sulphurous acid  
(3) Sulphuryl chloride  
(4) Thionyl chloride

29. An example for a neutral buffer is

(1) Ammonium hydroxide and Ammonium chloride  
(2) Acetic acid and Sodium acetate  
(3) Acetic acid and Ammonium hydroxide  
(4) Citric acid and Sodium citrate

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Space For Rough Work
30. Least energetic conformation of cyclohexane is
   (1) Chain conformation  (2) Boat conformation
   (3) Cis conformation    (4) E-z form

31. Which of the following is employed in flash tubes in photography?
   (1) Ar                   (2) Ne
   (3) Kr                   (4) Xe

32. Conjugate base of $\text{H}_2\text{PO}_4^-$ is
   (1) $\text{HPO}_4^-$      (2) $\text{HPO}_4^{2-}$
   (3) $\text{H}_3\text{PO}_4$  (4) $\text{PO}_4^{3-}$

33. An alkyl bromide (X) reacts with Sodium in ether to form 4, 5-diethyl octane, the compound ‘X’ is
   (1) $\text{CH}_3(\text{CH}_2)_3\text{Br}$     (2) $\text{CH}_3(\text{CH}_2)_3\text{Br}$
   (3) $\text{CH}_3(\text{CH}_2)_3\text{CH(Br)CH}_3$ (4) $\text{CH}_3-(\text{CH}_2)_2-\text{CH(Br)-CH}_2-\text{CH}_3$

34. Which one of the following shows highest magnetic moment?
   (1) $\text{Fe}^{2+}$     (2) $\text{CO}^{2+}$
   (3) $\text{Cr}^{3+}$    (4) $\text{Ni}^{2+}$

Space For Rough Work
35. The emf of a galvanic cell constituted with the electrodes Zn$^{2+}$ | Zn (−0.76 V) and Fe$^{2+}$|Fe(−0.41 V) is

(1) −0.35 V  (2) +1.17 V
(3) +0.35 V  (4) −1.17 V

36. Which of the following pairs are correctly matched?

<table>
<thead>
<tr>
<th>Reactants</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. RX + AgOH$_{(aq)}$</td>
<td>RH</td>
</tr>
<tr>
<td>II. RX + AgCN$_{(alco)}$</td>
<td>RNC</td>
</tr>
<tr>
<td>III. RX + KCN$_{(alco)}$</td>
<td>RNC</td>
</tr>
<tr>
<td>IV. RX + Na$_{(ether)}$</td>
<td>R−R</td>
</tr>
</tbody>
</table>

(1) I alone  (2) I and II
(3) II and III (4) II and IV

37. In a transition series, with the increase in atomic-number, the paramagnetism

(1) increases gradually
(2) decreases gradually
(3) first increases to a maximum and then decreases
(4) first decreases to a minimum and then increases

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Space For Rough Work
38. Identify a species which is ‘NOT’ a Bronsted acid but a Lewis acid.

(1) BF$_3$          (2) H$_3^+$O
(3) NH$_3$          (4) HCl

39. The compound formed when calcium acetate and calcium formate is dry distilled.

(1) Acetone          (2) Acetaldehyde
(3) Benzaldehyde    (4) Acetophenone

40. d$^2$sp$^3$ hybridisation of the atomic orbitals gives

(1) Square planar structure           (2) Triangular structure
(3) Tetrahedral structure             (4) Octahedral structure

41. The pH of 10$^{-8}$M HCl solution is

(1) 8          (2) 6.9586
(3) More than 8          (4) Slightly more than 7

Space For Rough Work
42. Which of the following is strongly acidic?

(1) Phenol  (2) o-cresol
(3) p-nitrophenol  (4) p-cresol

43. A group of atoms can function as a ligand only when

(1) it is a small molecule.  (2) it has an unshared electron pair.
(3) it is a negatively charged ion.  (4) it is a positively charged ion.

44. Which of the following is ‘NOT’ a colligative property?

(1) Elevation in boiling point  (2) Depression in freezing point
(3) Osmotic pressure  (4) Lowering of vapour pressure

45. Acetone and Propanal are

(1) Functional isomers  (2) Position isomers
(3) Geometrical isomers  (4) Optical isomers

46. Which of the following is diamagnetic?

(1) $H_2^+$  (2) $He_2^+$
(3) $O_2$  (4) $N_2$
47. 3 gms of urea is dissolved in 45 gms of H₂O. The relative lowering in vapour pressure is

(1) 0.05  (2) 0.04
(3) 0.02  (4) 0.01

48. The reagent used to distinguish between acetaldehyde and benzaldehyde is

(1) Tollen’s reagent  (2) Fehling’s solution
(3) 2-4-dinitrophenyl hydrazine  (4) Semicarbazide

49. Metallic lustre is due to

(1) high density of metals
(2) high polish on the surface of metals
(3) reflection of light by mobile electrons
(4) chemical inertness of metals

50. Which of the following aqueous solutions will exhibit highest boiling point?

(1) 0.01 M urea  (2) 0.01 M KNO₃
(3) 0.01 M Na₂SO₄  (4) 0.015 M C₆H₁₂O₆

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Space For Rough Work
51. Which one of the following gives amine on heating with amide?

(1) Br₂ in aqueous KOH  
(2) Br₂ in alcoholic KOH
(3) Cl₂ in Sodium  
(4) Sodium in Ether

52. The number of antibonding electrons present in O₂⁻ molecular ion is

(1) 8  
(2) 6
(3) 5  
(4) 4

53. The process is spontaneous at the given temperature, if

(1) ΔH is +ve and ΔS is −ve  
(2) ΔH is −ve and ΔS is +ve
(3) ΔH is +ve and ΔS is +ve  
(4) ΔH is +ve and ΔS is equal to zero

54. Glucose when reduced with HI and Red Phosphorus gives

(1) n-hexane  
(2) n-heptane
(3) n-pentane  
(4) n-octane

55. The stability of a Lyophobic colloid is due to

(1) Adsorption of covalent molecules on the colloid
(2) The size of the particles
(3) The charge on the particles
(4) Tyndall effect

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Space For Rough Work
56. Oils are liquids at room temperature since they contain higher percentage of
   (1) Oleates
   (2) Palmitates
   (3) Stearates
   (4) Myristates

57. Which of the following cations will have minimum flocculation value for arsenic sulphide sol?
   (1) Na⁺
   (2) Mg²⁺
   (3) Ca²⁺
   (4) Al³⁺

58. The value of entropy of solar system is
   (1) increasing
   (2) decreasing
   (3) constant
   (4) zero

59. In face centred cubic lattice, a unit cell is shared equally by how many unit cells?
   (1) 6
   (2) 4
   (3) 2
   (4) 8

60. The number of disulphide linkages present in Insulin are
   (1) 4
   (2) 3
   (3) 2
   (4) 1

Space For Rough Work