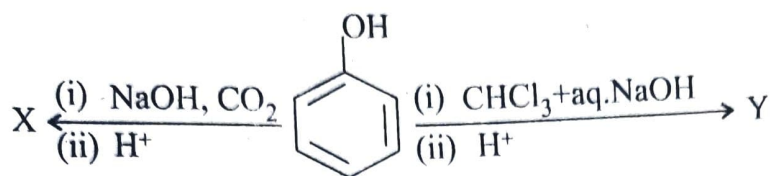
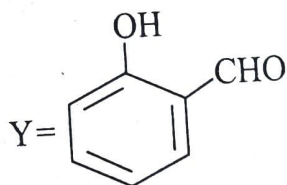
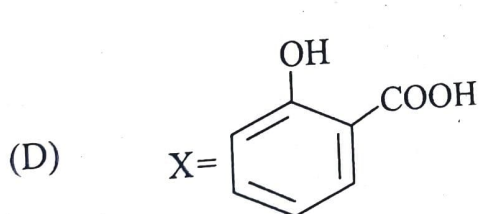
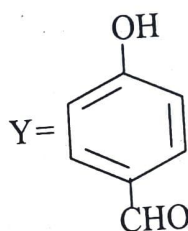
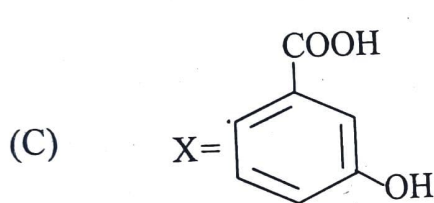
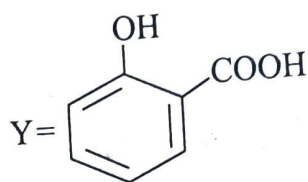
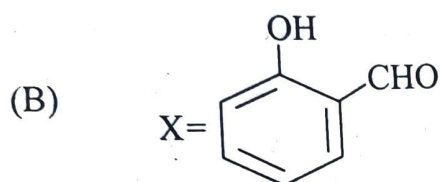
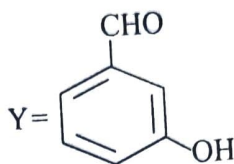
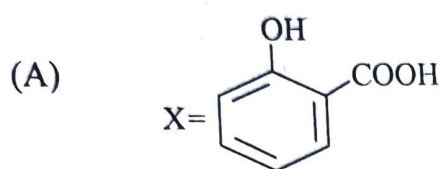


55. Consider the following reaction :



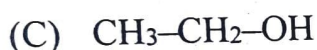
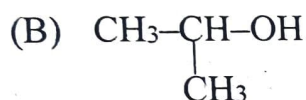
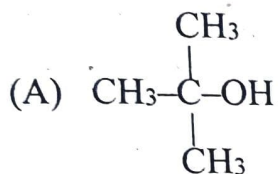
the products X and Y are



Case : Read the passage given below and answer the following questions (53-55).

Alcohols and Phenols are acidic in nature. Electron withdrawing groups in phenol increase its acidic strength and electron donating groups decrease it. Alcohols undergo nucleophilic substitution with hydrogen halides to give alkyl halides. On oxidation primary alcohols yield aldehydes with mild oxidising agents and carboxylic acids with strong oxidising agents while secondary alcohols yield ketones. The presence of $-OH$ groups in phenols activates the ring towards electrophilic substitution. Various important products are obtained from phenol like salicylaldehyde, salicylic acid, picric acid etc.

53. Which of the following alcohols is resistant to oxidation?



54. Which of the following group increases the acidic character of phenol?



Section – C

This section consists of 6 multiple choice questions with an overall choice to attempt any 5. In case more than desirable number of questions are attempted, ONLY first 5 will be considered for evaluation.

50. Match the following:

I	II
(i) Stoichiometric defects	(a) Crystalline solids
(ii) long range order	(b) F-centres
(iii)ABC ABC ABC.....	(c) Schottky and Frenkel defects
(iv) Number of atoms per unit cell=2	(d) fcc structure
(v) Metal excess defect due to anionic vacancies	

Which of the following is the best matched options?

- (A) (i) – (d), (ii) – (a), (iii) – (b), (iv) – (c)
- (B) (i) – (c), (ii) – (a), (iii) – (d), (v) – (b)
- (C) (i) – (c), (ii) – (a), (iii) – (d), (iv) – (b)
- (D) (i) – (a), (ii) – (b), (v) – (c), (iv) – (d)

51. Which of the following analogies is correct?

- (A) XeF_2 : linear :: XeF_6 : square planar
- (B) moist SO_2 : Reducing agent :: Cl_2 : bleaching agent
- (C) N_2 : Highly reactive gas :: F_2 : inert at room temperature
- (D) NH_3 : strong base :: HI : weak acid

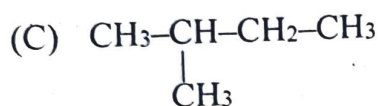
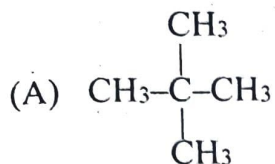
52. Complete the following analogy :
Curdling of milk : A :: α -helix : B

- (A) A : Primary structure B : Secondary structure
- (B) A : Denatured protein B : Primary structure
- (C) A : Secondary structure B : Denatured protein
- (D) A : Denatured protein B : Secondary structure



47. **Assertion (A)** : Chlorobenzene is less reactive towards nucleophilic substitution reaction.
Reason (R) : Nitro group in chlorobenzene increases its reactivity towards nucleophilic substitution reaction.
- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.
48. **Assertion (A)** : Due to Schottky defect, there is no effect on the density of a solid.
Reason (R) : Equal number of cations and anions are missing from their normal sites in Schottky defect.
- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.
49. **Assertion (A)** : Fluorine forms only one oxoacid HOF.
Reason (R) : Fluorine atom is highly electronegative.
- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

44. Which of the following isomer of pentane (C_5H_{12}) will give three isomeric monochlorides on photochemical chlorination?



(D) All of the above

Given below are the questions (45-49) labelled as **Assertion (A)** and **Reason (R)**.

Select the most appropriate answer from the options given below :

45. **Assertion (A)** : A raw mango placed in a saline solution loses water and shrivel into pickle.

Reason (R) : Through the process of reverse osmosis, raw mango shrivel into pickle.

- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

46. **Assertion (A)** : H_2S is less acidic than H_2Te .

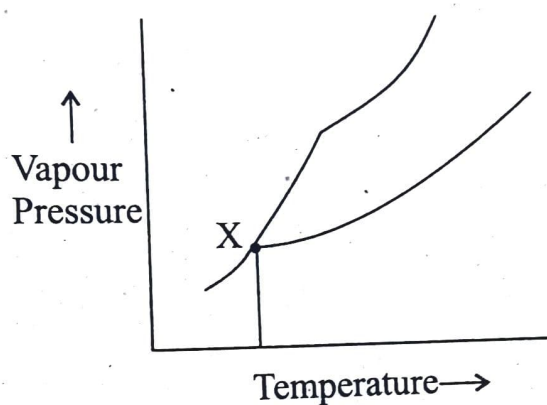
Reason (R) : H-S bond has more $\Delta_{\text{bond}} H^\circ$ than H-Te bond

- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

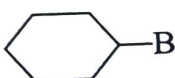
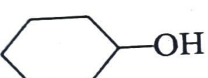
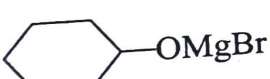
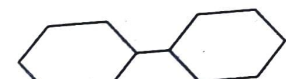
40. Glucose on reaction with Br_2 water gives:
- (A) Saccharic acid
 - (B) Hexanoic acid
 - (C) Gluconic acid
 - (D) Salicylic acid
41. Which of the following is optically inactive?
- (A) (+) – Butan-2-ol
 - (B) (–) – Butan-2-ol
 - (C) ($\pm$) – Butan-2-ol
 - (D) (+) – 2 – Bromobutane
42. Which of the following is not a correct statement?
- (A) Halogens are strong oxidising agents.
 - (B) Halogens are more reactive than interhalogens.
 - (C) All halogens are coloured.
 - (D) Halogens have maximum negative electron gain enthalpy.
43. Which of the following has highest boiling point?
- (A) $\text{C}_2\text{H}_5\text{-F}$
 - (B) $\text{C}_2\text{H}_5\text{-Cl}$
 - (C) $\text{C}_2\text{H}_5\text{-Br}$
 - (D) $\text{C}_2\text{H}_5\text{-I}$



36. Nucleic acids are polymer of
 (A) amino acids
 (B) nucleosides
 (C) nucleotides
 (D) glucose
37. Which of the following gas dimerises to become stable?
 (A) CO_2 (g)
 (B) NO_2 (g)
 (C) SO_2 (g)
 (D) N_2O (g)
38. In the following diagram point, 'X' represents



- (A) Boiling point of solution
 (B) Freezing point of solvent
 (C) Boiling point of solvent
 (D) Freezing point of solution
39. XeF_6 on reaction with NaF gives
 (A) $\text{Na}^+[\text{XeF}_7]^-$
 (B) $[\text{NaF}_2]^- [\text{XeF}_5]^+$
 (C) $\text{Na}^+[\text{XeF}_6]^-$
 (D) $[\text{NaF}_2]^+ [\text{XeF}_5]^-$

31. Sulphuric acid is used to prepare more volatile acids from their corresponding salts due to its
- strong acidic nature
 - low volatility
 - strong affinity for water
 - ability to act as a dehydrating agent
32. An element with density 6 g cm^{-3} forms a fcc lattice with edge length of $4 \times 10^{-8} \text{ cm}$. The molar mass of the element is ($N_A = 6 \times 10^{23} \text{ mol}^{-1}$)
- 57.6 g mol^{-1}
 - 28.8 g mol^{-1}
 - 82.6 g mol^{-1}
 - 62 g mol^{-1}
33. In the reaction  $\xrightarrow[\text{dry ether}]{\text{Mg}}$ 'X' $\xrightarrow{\text{H}_2\text{O}}$ 'Y' compound 'Y' is
- 
 - 
 - 
 - 
34. Which of the following is the weakest reducing agent in group 15?
- NH_3
 - PH_3
 - AsH_3
 - BiH_3
35. The boiling point of a 0.2 m solution of a non-electrolyte in water is ($K_b \text{ for water} = 0.52 \text{ K kg mol}^{-1}$)
- 100°C
 - 100.52°C
 - 100.104°C
 - 100.26°C

Section – B

This section consists of 24 multiple choice questions with overall choice to attempt any 20 questions. In case more than desirable number of questions are attempted, ONLY first 20 will be considered for evaluation.

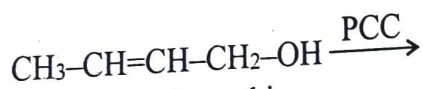
26. An unknown gas 'X' is dissolved in water at 2.5 bar pressure and has mole fraction 0.04 in solution. The mole fraction of 'X' gas when the pressure of gas is doubled at the same temperature is

- (A) 0.08
- (B) 0.04
- (C) 0.02
- (D) 0.92

27. The base which is present in DNA but not in RNA, is

- (A) Cytosine
- (B) Guanine
- (C) Adenine
- (D) Thymine

28. In the following reaction



the product formed is

- (A) $\text{CH}_3\text{--CHO}$ and $\text{CH}_3\text{CH}_2\text{OH}$
- (B) $\text{CH}_3\text{--CH=CH--COOH}$
- (C) $\text{CH}_3\text{--CH=CH--CHO}$
- (D) $\text{CH}_3\text{--CH}_2\text{--CH}_2\text{--CHO}$

29. Enantiomers differ only in

- (A) boiling point
- (B) rotation of polarised light
- (C) melting point
- (D) solubility

30. The number of lone pairs of electrons in XeF_4 is

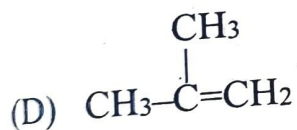
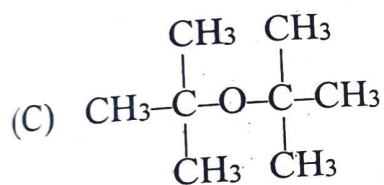
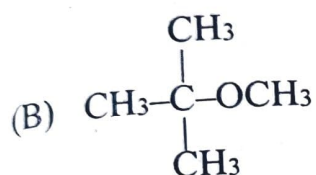
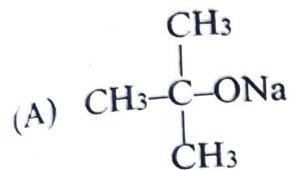
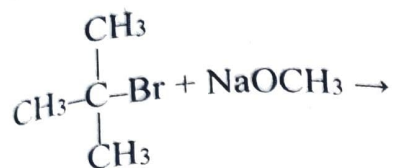
- (A) zero
- (B) one
- (C) two
- (D) three

[P.T.O.]



22. Which of the following is a network solid?
- (A) SO_2
 - (B) SiO_2
 - (C) CO_2
 - (D) H_2O

23. Major product formed in the following reaction



24. Chlorine reacts with cold and dilute NaOH to give

- (A) NaCl and NaClO_3
- (B) NaCl and NaClO
- (C) NaCl and NaClO_4
- (D) NaClO and NaClO_3

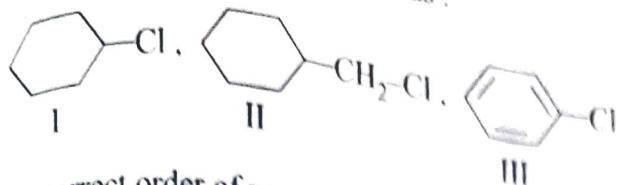
25. Elevation of boiling point is inversely proportional to

- (A) molal elevation constant (K_b)
- (B) molality (m)
- (C) molar mass of solute (M)
- (D) weight of solute (W)

[P.T.O.]



17. Consider the following compounds :



the correct order of reactivity towards S_N2 reaction

- (A) $I > III > II$
- (B) $II > III > I$
- (C) $II > I > III$
- (D) $III > I > II$

18. Which of the following forms strong $p\pi-p\pi$ bonding?

- (A) S_8
- (B) Se_8
- (C) Te_8
- (D) O_2

19. F_2 acts as a strong oxidising agent due to

- (A) low $\Delta_{\text{bond}} H^\circ$ and low $\Delta_{\text{hyd}} H^\circ$
- (B) low $\Delta_{\text{bond}} H^\circ$ and high $\Delta_{\text{hyd}} H^\circ$
- (C) high $\Delta_{\text{bond}} H^\circ$ and high $\Delta_{\text{eg}} H^\circ$
- (D) low $\Delta_{\text{hyd}} H^\circ$ and low $\Delta_{\text{eg}} H^\circ$

20. Which of the following sugar is known as dextrose?

- (A) Glucose
- (B) Fructose
- (C) Ribose
- (D) Sucrose

21. Cu reacts with dilute HNO_3 to evolve which gas?

- (A) N_2O
- (B) NO_2
- (C) NO
- (D) N_2



12. Which of the following acids reacts with acetic anhydride to form a compound Aspirin?

- (A) Benzoic acid
- (B) Salicylic acid
- (C) Phthalic acid
- (D) Acetic acid

13. Which of the following statements is wrong?

- (A) Oxygen shows $p\pi - p\pi$ bonding.
- (B) Sulphur shows little tendency of catenation.
- (C) Oxygen is diatomic whereas sulphur is polyatomic.
- (D) O-O bond is stronger than S-S bond.

14. Amino acids which cannot be synthesized in the body and must be obtained through diet are known as

- (A) Acidic amino acids
- (B) Essential amino acids
- (C) Basic amino acids
- (D) Non-essential amino acids

15. Which one of the following halides contains $C_{sp^2}-X$ bond?

- (A) Allyl halide
- (B) Alkyl halide
- (C) Benzyl halide
- (D) Vinyl halide

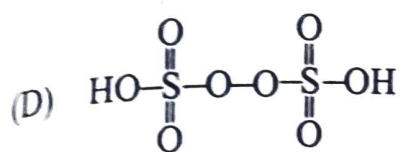
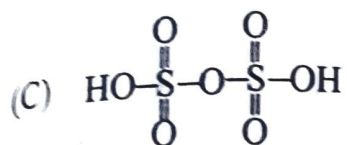
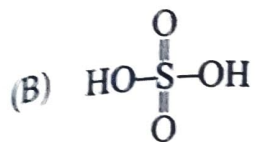
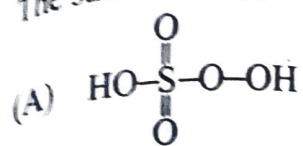
16. On mixing 20 mL of acetone with 30 mL of chloroform, the total volume of the solution is

- (A) < 50 mL
- (B) $= 50$ mL
- (C) > 50 mL
- (D) $= 10$ mL

6. Nucleosides are composed of
 (A) a pentose sugar and phosphoric acid
 (B) a nitrogenous base and phosphoric acid
 (C) a nitrogenous base and a pentose sugar
 (D) a nitrogenous base, a pentose sugar and phosphoric acid
7. The oxidation state of -2 is most stable in :
 (A) O
 (B) S
 (C) Se
 (D) Te
8. Which of the following is not a characteristic of a crystalline solid?
 (A) A true solid
 (B) A regular arrangement of constituent particles
 (C) Sharp melting point
 (D) Isotropic in nature
9. Which of the following formula represents Raoult's law for a solution containing non-volatile solute ?
 (A) $p_{\text{solute}} = p^{\circ}_{\text{solute}} \cdot X_{\text{solute}}$
 (B) $p = K_H \cdot X$
 (C) $P_{\text{Total}} = p_{\text{solvent}}$
 (D) $p_{\text{solute}} = p^{\circ}_{\text{solvent}} \cdot X_{\text{solvent}}$
10. An azeotropic solution of two liquids has a boiling point lower than either of the two when it
 (A) shows a positive deviation from Raoult's law.
 (B) shows a negative deviation from Raoult's law.
 (C) shows no deviation from Raoult's law.
 (D) is saturated.
11. Which of the following crystal will show metal excess defect due to extra cation?
 (A) AgCl
 (B) NaCl
 (C) FeO
 (D) ZnO



3. The structure of pyrosulphuric acid is



4. The C-O-H bond angle in alcohol is

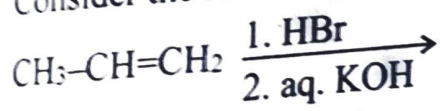
(A) slightly greater than $109^{\circ}28'$.

(B) slightly less than $109^{\circ}28'$.

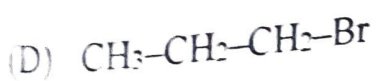
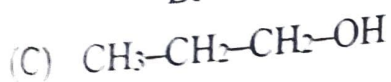
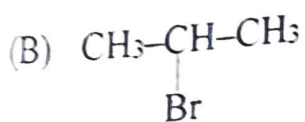
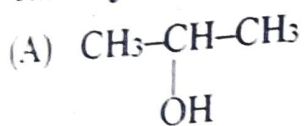
(C) slightly greater than 120° .

(D) slightly less than 120° .

5. Consider the following reaction :



The major end product is



General Instructions :

1. This question paper contains **55** questions out of which **45** questions are to be attempted.
2. All questions carry **equal marks**.
3. This question paper consists of three Sections - **Section A, B and C**.
4. **Section A** contains 25 questions. Attempt any **20** questions from Q. No. 01 to 25.
5. **Section B** contains 24 questions. Attempt any **20** questions from Q. No. 26 to 49.
6. **Section C** contains 6 questions. Attempt any **5** questions from Q. No. 50 to 55.
7. The first 20 questions attempted in **Section A** and **Section B** and first 5 questions attempted in **Section C** by a candidate will be evaluated.
8. There is only one correct option for every multiple choice question (MCQ). Marks will not be awarded for answering more than one option.
9. There is no negative marking.

Section - A

This section consists of **25** multiple choice questions with overall choice to attempt any **20** questions. In case more than desirable number of questions are attempted, **ONLY** first 20 will be considered for evaluation.

1. Which one of the following pairs will form an ideal solution?

- (A) Chloroform and acetone
- (B) Ethanol and acetone
- (C) n-hexane and n-heptane
- (D) Phenol and aniline

2. Which of the following is known as amorphous solid?

- (A) Glass
- (B) Plastic
- (C) Rubber
- (D) All of the above

