

# FINAL JEE-MAIN EXAMINATION – JANUARY, 2023

(Held On Wednesday 1<sup>st</sup> February, 2023)

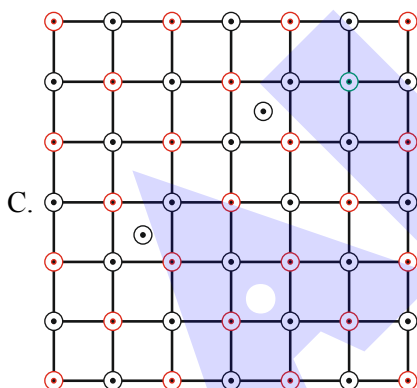
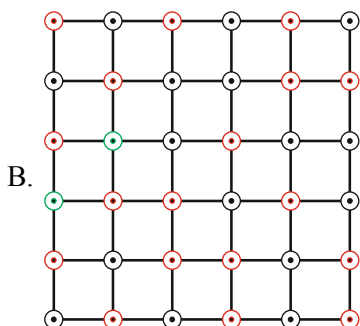
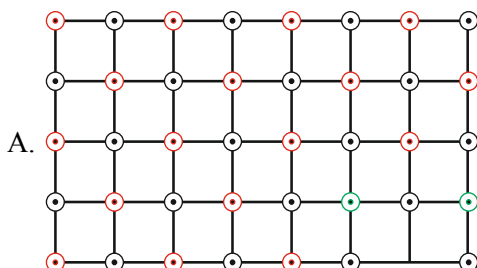
TIME : 9 : 00 AM to 12 : 00 NOON

## CHEMISTRY

### SECTION-A

31. Which of the following represents the lattice structure of  $A_{0.95}O$  containing  $A^{2+}$ ,  $A^{3+}$  and  $O^{2-}$  ions?

●  $A^{2+}$  ●  $A^{3+}$  ○  $O^{2-}$



(1) B and C only

(2) B only

(3) A and B only

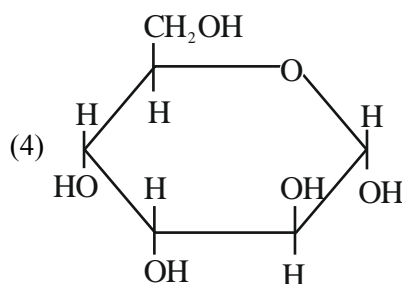
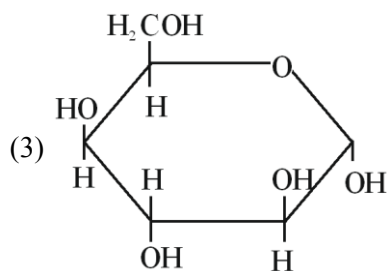
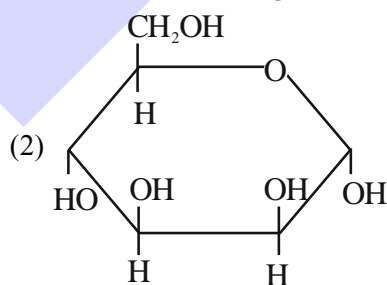
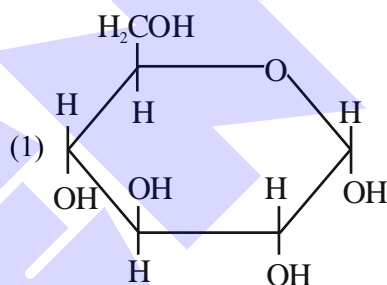
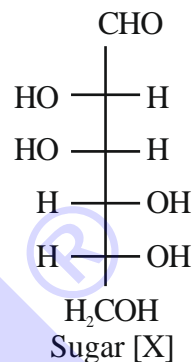
(4) A only

Official Ans. by NTA (4)

Allen Ans. (4)

## TEST PAPER WITH ANSWER

32. The correct representation in six membered pyranose form for the following sugar [X] is



Official Ans. by NTA (2)

Allen Ans. (2)

33. Highest oxidation state of Mn is exhibited in  $Mn_2O_7$ . The correct statements about  $Mn_2O_7$  are
- (A) Mn is tetrahedrally surrounded by oxygen atoms  
 (B) Mn is octahedrally surrounded by oxygen atoms  
 (C) Contains Mn-O-Mn bridge  
 (D) Contains Mn-Mn bond.

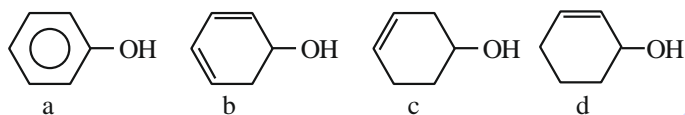
Choose the correct answer from the options given below

- (1) A and C only                      (2) A and D only  
 (3) B and D only                      (4) B and C only

**Official Ans. by NTA (1)**

**Allen Ans. (1)**

34. Decreasing order of dehydration of the following alcohols is



- (1)  $a > d > b > c$   
 (2)  $b > d > c > a$   
 (3)  $b > a > d > c$   
 (4)  $d > b > c > a$

**Official Ans. by NTA (2)**

**Allen Ans. (2)**

35. Given below are two statements: One is labelled as **Assertion A** and the other is labelled as **Reason R**.  
**Assertion A:** Amongst He, Ne, Ar and Kr; 1 g of activated charcoal adsorbs more of Kr.

**Reason R :** The critical volume  $V_c$  ( $\text{cm}^3 \text{mol}^{-1}$ ) and critical pressure  $P_c$  (atm) is highest for Krypton but the compressibility factor at critical point  $Z_c$  is lowest for Krypton.

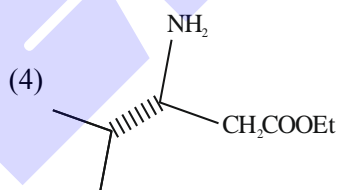
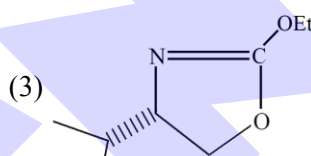
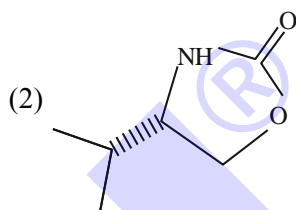
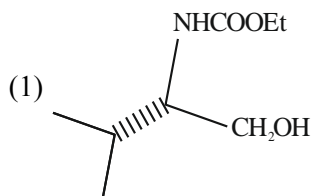
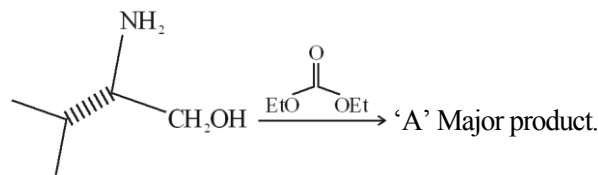
In the light of the above statements, choose the correct answer from the options given below.

- (1) **A** is true but **R** is false  
 (2) **A** is false but **R** is true  
 (3) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**  
 (4) Both **A** and **R** are true and **R** is the correct explanation of **A**

**Official Ans. by NTA (1)**

**Allen Ans. (1)**

36. In the following reaction, 'A' is



**Official Ans. by NTA (2)**

**Allen Ans. (2)**

37. Match List I with List II.

List-I	List-II
(A) Tranquilizers	(I) Anti blood clotting
(B) Aspirin	(II) Salvarsan
(C) Antibiotic	(III) Antidepressant drugs
(D) Antiseptic	(IV) Soframicine

Choose the correct answer from the options given below:

- (1) (A) – IV, (B) – II, (C) – I, (D) – III  
 (2) (A) – II, (B) – I, (C) – III, (D) – IV  
 (3) (A) – III, (B) – I, (C) – II, (D) – IV  
 (4) (A) – II, (B) – IV, (C) – I, (D) – III

**Official Ans. by NTA (3)**

**Allen Ans. (3)**

38. Given below are two statements:

**Statement I:** Chlorine can easily combine with oxygen to form oxides; and the product has a tendency to explode.

**Statement II:** Chemical reactivity of an element can be determined by its reaction with oxygen and halogens.

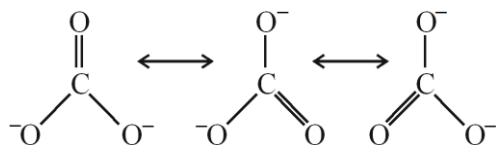
In the light of the above statements, choose the **correct** answer from the options given below.

- (1) Both the statements I and II are true
- (2) Statement I is true but Statement II is false
- (3) Statement I is false but Statement II is true
- (4) Both the Statements I and II are false

**Official Ans. by NTA (1)**

**Allen Ans. (1)**

39. Resonance in carbonate ion ( $\text{CO}_3^{2-}$ ) is



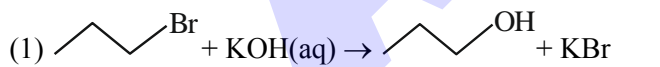
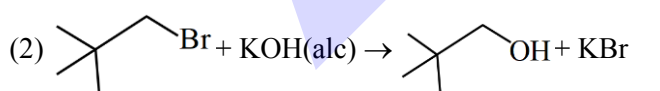
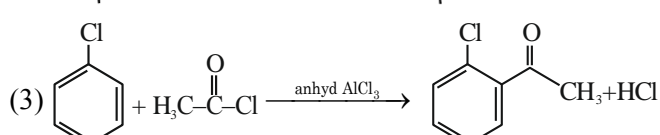
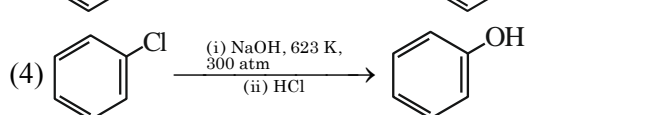
Which of the following is true?

- (1) It is possible to identify each structure individually by some physical or chemical method.
- (2) All these structures are in dynamic equilibrium with each other.
- (3) Each structure exists for equal amount of time.
- (4)  $\text{CO}_3^{2-}$  has a single structure i.e., resonance hybrid of the above three structures.

**Official Ans. by NTA (4)**

**Allen Ans. (4)**

40. Identify the incorrect option from the following:

- (1) 
- (2) 
- (3) 
- (4) 

**Official Ans. by NTA (2)**

**Allen Ans. (2)**

41. A solution of  $\text{FeCl}_3$  when treated with  $\text{K}_4[\text{Fe}(\text{CN})_6]$  gives a prussian blue precipitate due to the formation of

- (1)  $\text{K}[\text{Fe}_2(\text{CN})_6]$
- (2)  $\text{Fe}[\text{Fe}(\text{CN})_6]$
- (3)  $\text{Fe}_3[\text{Fe}(\text{CN})_6]_2$
- (4)  $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$

**Official Ans. by NTA (4)**

**Allen Ans. (4)**

42. Which of the following are the example of double salt?

- (A)  $\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$
- (B)  $\text{CuSO}_4 \cdot 4\text{NH}_3 \cdot \text{H}_2\text{O}$
- (C)  $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$
- (D)  $\text{Fe}(\text{CN})_2 \cdot 4\text{KCN}$

Choose the correct answer.

- (1) A and C only
- (2) A and B only
- (3) A, B and D only
- (4) B and D only

**Official Ans. by NTA (1)**

**Allen Ans. (1)**

43. Which of the following complex will show largest splitting of d-orbitals?

- (1)  $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$
- (2)  $[\text{FeF}_6]^{3-}$
- (3)  $[\text{Fe}(\text{CN})_6]^{3-}$
- (4)  $[\text{Fe}(\text{NH}_3)_6]^{3+}$

**Official Ans. by NTA (3)**

**Allen Ans. (3)**

44. How can photochemical smog be controlled?

- (1) By using tall chimneys
- (2) By complete combustion of fuel
- (3) By using catalytic converters in the automobiles/industry
- (4) By using catalyst

**Official Ans. by NTA (3)**

**Allen Ans. (3)**

45. Match List I with List II.

	List I		List II
(A)	Slaked lime	(I)	NaOH
(B)	Dead burnt plaster	(II)	Ca(OH) <sub>2</sub>
(C)	Caustic soda	(III)	Na <sub>2</sub> CO <sub>3</sub> ·10H <sub>2</sub> O
(D)	Washing soda	(IV)	CaSO <sub>4</sub>

Choose the correct answer form the options given below:

- (1) (A) – I, (B) – IV, (C) – II, (D) – III  
 (2) (A) – III, (B) – IV, (C) – II, (D) – I  
 (3) (A) – II, (B) – IV, (C) – I, (D) – III  
 (4) (A) – III, (B) – II, (C) – IV, (D) – I

**Official Ans. by NTA (3)**

**Allen Ans. (3)**

46. Choose the correct statement(s):

- A. Beryllium oxide is purely acidic in nature.  
 B. Beryllium carbonate is kept in the atmosphere of CO<sub>2</sub>.  
 C. Beryllium sulphate is readily soluble in water.  
 D. Beryllium shows anomalous behavior.

Choose the correct answer from the options given below:

- (1) A, B and C only  
 (2) B, C and D only  
 (3) A and B only  
 (4) A only

**Official Ans. by NTA (2)**

**Allen Ans. (2)**

47. Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**

**Assertion A:** In an Ellingham diagram, the oxidation of carbon to carbon monoxide shows a negative slope with respect to temperature.

**Reason R:** CO tends to get decomposed at higher temperature.

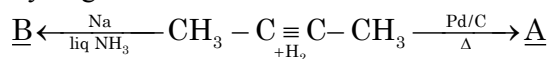
In the light of the above statements, choose the **correct** answer from the options given below

- (1) Both **A** and **R** are correct and **R** is the correct explanation of **A**  
 (2) **A** is not correct but **R** is correct  
 (3) Both **A** and **R** are correct but **R** is **NOT** the correct explanation of **A**  
 (4) **A** is correct but **R** is not correct

**Official Ans. by NTA (4)**

**Allen Ans. (4)**

48. But-2-yne is reacted separately with one mole of Hydrogen as shown below:



- A. A is more soluble than B.  
 B. The boiling point & melting point of A are higher and lower than B respectively.  
 C. A is more polar than B because dipole moment of A is zero.  
 D. Br<sub>2</sub> adds easily to B than A.

Identify the incorrect statements from the options given below :-

- (1) B and C only  
 (2) B, C and D only  
 (3) A, C and D only  
 (4) A and B only

**Official Ans. by NTA (DROP)**

**Allen Ans. (Bonus)**

49. Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**

**Assertion A:** Hydrogen is an environment friendly fuel.

**Reason R:** Atomic number of hydrogen is 1 and it is a very light element.

In the light of the above statements, choose the **correct** answer from the options given below

- (1) **A** is true but **R** is false  
 (2) Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**  
 (3) **A** is false but **R** is true  
 (4) Both **A** and **R** are true and **R** is the correct explanation of **A**

**Official Ans. by NTA (2)**

**Allen Ans. (2)**

50. Match List I and List II.

List I	List II
Test	Functional group / Class of Compound
(A) Molisch's Test	(I) Peptide
(B) Biuret Test	(II) Carbohydrate
(C) Carbylamine Test	(III) Primary amine
(D) Schiff's Test	(IV) Aldehyde

Choose the correct answer from the options given below:

- (1) (A) – I, (B) – II, (C) – III, (D) – IV  
 (2) (A) – III, (B) – IV, (C) – I, (D) – II  
 (3) (A) – II, (B) – I, (C) – III, (D) – IV  
 (4) (A) – III, (B) – IV, (C) – II, (D) – I

**Official Ans. by NTA (3)**

**Allen Ans. (3)**

## SECTION-B

51. The density of 3 M solution of NaCl is  $1.0 \text{ g mL}^{-1}$ . Molality of the solution is  $\times 10^{-2} \text{ m}$ . (Nearest integer).

Given: Molar mass of Na and Cl is 23 and  $35.5 \text{ g mol}^{-1}$  respectively.

**Official Ans. by NTA (364)**

**Allen Ans. (364)**

52. Electrons in a cathode ray tube have been emitted with a velocity of  $1000 \text{ ms}^{-1}$ . The number of following statements which is/are true about the emitted radiation is \_\_\_\_\_.

Given :  $h = 6 \times 10^{-34} \text{ Js}$ ,  $m_e = 9 \times 10^{-31} \text{ kg}$ .

- (A) The deBroglie wavelength of the electron emitted is  $666.67 \text{ nm}$ .  
 (B) The characteristic of electrons emitted depend upon the material of the electrodes of the cathode ray tube.  
 (C) The cathode rays start from cathode and move towards anode.  
 (D) The nature of the emitted electrons depends on the nature of the gas present in cathode ray tube.

**Official Ans. by NTA (2)**

**Allen Ans. (2)**

53. Sum of oxidation states of bromine in bromic acid and perbromic acid is \_\_\_\_\_.

**Official Ans. by NTA (12)**

**Allen Ans. (12)**

54. At what pH, given half cell  $\text{MnO}_4^- (0.1 \text{ M}) | \text{Mn}^{2+} (0.001 \text{ M})$  will have electrode potential of  $1.282 \text{ V}$ ? \_\_\_\_\_ (Nearest Integer)

Given  $E^\circ_{\text{MnO}_4^-/\text{Mn}^{2+}} = 1.54 \text{ V}$ ,  $\frac{2.303RT}{F} = 0.059 \text{ V}$

**Official Ans. by NTA (3)**

**Allen Ans. (3)**

55. Number of isomeric compounds with molecular formula  $\text{C}_9\text{H}_{10}\text{O}$  which (i) do not dissolve in NaOH (ii) do not dissolve in HCl. (iii) do not give orange precipitate with 2, 4 – DNP (iv) on hydrogenation give identical compound with molecular formula  $\text{C}_9\text{H}_{12}\text{O}$  is \_\_\_\_\_.

**Official Ans. by NTA (2)**

**Allen Ans. (0)**

56. (i)  $\text{X(g)} \rightleftharpoons \text{Y(g)} + \text{Z(g)}$   $K_{p1} = 3$

- (ii)  $\text{A(g)} \rightleftharpoons 2\text{B(g)}$   $K_{p2} = 1$

If the degree of dissociation and initial concentration of both the reactants X(g) and A(g) are equal, then

the ratio of the total pressure at equilibrium  $\left(\frac{p_1}{p_2}\right)$  is

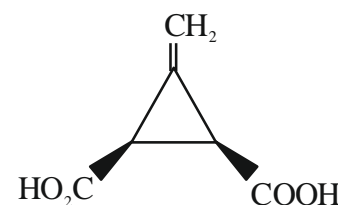
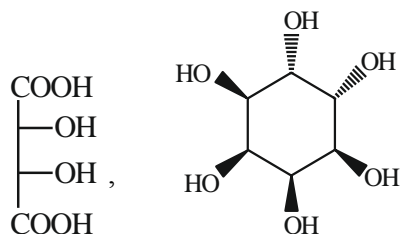
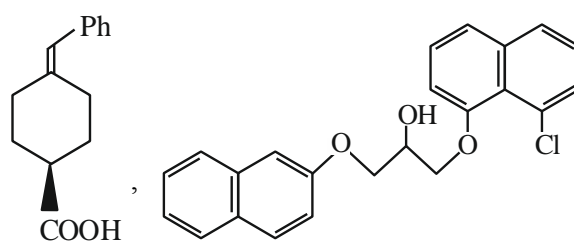
equal to  $x : 1$ . The value of  $x$  is \_\_\_\_\_

(Nearest integer)

**Official Ans. by NTA (12)**

**Allen Ans. (12)**

57. The total number of chiral compound/s from the following is \_\_\_\_\_.



**Official Ans. by NTA (2)**

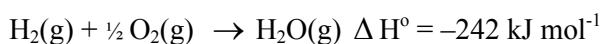
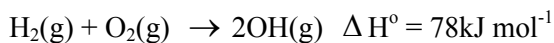
**Allen Ans. (2)**

58. A and B are two substances undergoing radioactive decay in a container. The half life of A is 15 min and that of B is 5 min. If the initial concentration of B is 4 times that of A and they both start decaying at the same time, how much time will it take for the concentration of both of them to be same? \_\_\_\_\_ min.

**Official Ans. by NTA (15)**

**Allen Ans. (15)**

59. At 25°C, the enthalpy of the following processes are given:



What would be the value of X for the following reaction? \_\_\_\_\_ (Nearest integer)



**Official Ans. by NTA (499)**

**Allen Ans. (499)**

60. 25 mL of an aqueous solution of KCl was found to require 20 mL of 1 M  $\text{AgNO}_3$  solution when titrated using  $\text{K}_2\text{CrO}_4$  as an indicator. What is the depression in freezing point of KCl solution of the given concentration? \_\_\_\_\_ (Nearest integer).

(Given :  $K_f = 2.0 \text{ K kg mol}^{-1}$ )

Assume

1) 100% ionization and

2) density of the aqueous solution as  $1 \text{ g mL}^{-1}$

**Official Ans. by NTA (3)**

**Allen Ans. (3)**