

Test Booklet

Series

A

Test Booklet No.

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**Test Booklet
CHEMISTRY**

Name of Applicant Answer Sheet No.

Applicant Roll No. : Signature of Applicant :

Date of Examination: Signature of the Invigilator(s)
1.

Time of Examination : 2.

Duration : 1½ Hours]

[Maximum Marks : 70

IMPORTANT INSTRUCTIONS

- (i) The question paper is in the form of Test-Booklet containing **70 (Seventy)** questions. All questions are compulsory. Each question carries four answers marked (A), (B), (C) and (D), out of which only one is correct. Choose the correct option or the most appropriate option.
- (ii) On receipt of the Test-Booklet (Question Paper), the candidate should immediately check it and ensure that it contains all the pages, i.e., **70** questions. Discrepancy, if any, should be reported by the candidate to the invigilator immediately after receiving the Test-Booklet.
- (iii) A separate Answer-Sheet is provided with the Test-Booklet/Question Paper. On this sheet there are **70** rows containing four circles each. One row pertains to one question.
- (iv) The candidate should write his/her Application ID/Roll number at the places provided on the cover page of the Test-Booklet/Question Paper and on the Answer-Sheet and **NOWHERE ELSE**.
- (v) No second Test-Booklet/Question Paper and Answer-Sheet will be given to a candidate. The candidates are advised to be careful in handling it and writing the answer on the Answer-Sheet.
- (vi) For every correct answer of the question **One (1) mark will be awarded**.
- (vii) Marking shall be done only on the basis of answers responded on the Answer-Sheet.
- (viii) To mark the answer on the Answer-Sheet, candidate should **darken** the appropriate circle in the row of each question with Blue or Black pen.
- (ix) For each question only **one** circle should be **darkened** as a mark of the answer adopted by the candidate. If more than one circle for the question are found darkened or with one black circle any other circle carries any mark, the answer will be treated as incorrect.
- (x) The candidates should not remove any paper from the Test-Booklet/Question Paper. Attempting to remove any paper shall be liable to be punished for use of unfair means.
- (xi) Rough work may be done on the blank space provided in the Test-Booklet/Question Paper only.
- (xii) *Mobile phones (even in Switch-off mode) and such other communication/programmable devices are not allowed inside the examination hall.*
- (xiii) No candidate shall be permitted to leave the examination hall before the expiry of the time.

DO NOT OPEN THIS QUESTION BOOKLET UNTIL ASKED TO DO SO.

Chemistry

[P.T.O.

7 / 1

PART-A

1. Find the correctly spelt words.
(A) Puerrile (B) Puerrille
(C) Purrile (D) Puerile

2. Choose the part of sentence with error
The Ministry has directed banks / to do away with their / separate promotion policies, a move / strongly opposed by the officers' unions.
(A) The Ministry has directed banks
(B) to do away with their
(C) separate promotion policies, a move
(D) strongly opposed by the officers' unions

3. Choose the word which is most similar in meaning to the word given below :
Downturn
(A) operose (B) aeonian
(C) abetment (D) descent

4. Choose the word which is most similar in meaning to the word given below :
Foreclosure
(A) preclude (B) legalize
(C) deprive (D) allow

- Direction (Q. 5-7) :** Which of the following phrases (I), (II), and (III) given below each sentence should replace the phrase printed in bold and Italic letters to make the sentence grammatically correct?
Choose the best option among the given alternatives that reflect the correct use of phrase in the context of the grammatically correct sentence.

5. Every Open House we held since 2013 reaffirmed our belief that there is a need for human intervention *to retain its trust and credibility over the age of* anonymous communication.
(I) to retain trust and credibility in this age of
(II) to retaining trust and credibility ageing
(III) for retention of trust and credible age of
(A) Only (I) is correct (B) Only (III) is correct
(C) Both (I) and (II) are correct (D) Both (II) and (III) are correct

6. ***How it is possible for*** a multi-edition newspaper to produce completely different newspapers for various cities?
- (I) Is it possible for
 (II) Does it possible to
 (III) How is it possible for
- (A) Only (I) is correct (B) Only (II) is correct
 (C) Only (III) is correct (D) Both (I) and (III) are correct
7. It is a process where continuity and change ***are in consonance with each other***, where the introduction of a new segment does not subsume the importance of the existing segments.
- (I) is in consonance with one another
 (II) are in consonant to one another
 (III) is in consonance at each other
- (A) Only (I) is correct (B) Only (II) is correct
 (C) Both (I) and (III) are correct (D) No correction required
8. What is the least number of soldiers that can be drawn up in troops of 12, 15, 18 and 20 soldiers and also in form of a solid square?
- (A) 900 (B) 400
 (C) 1600 (D) 2500
9. In the Bombay Stock Exchange there are 45% female employees and thus the number of male employees is exceeded by 72. Hence the total no. of employees in the BSE is
- (A) 540 (B) 720
 (C) 800 (D) 550
10. Choose the best option to fill in the blanks.
 Elders
- (A) should respect (B) should be respect
 (C) should be respected (D) should have been respected

11. Choose the best option to fill in the blanks.

Girls have been teasing boys 20 minutes.

- (A) since (B) for
(C) from (D) in

12. Choose the best option to fill in the blanks.

..... Sagar Samrat is big ship.

- (A) A, a (B) A, the
(C) The, a (D) The, the

13. In a certain code, cloud is written as GTRKF. How is SIGHT written in that code?

- (A) UGHHT (B) UHJFW
(C) WFJGV (D) WGJHV

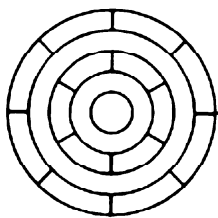
14. Arrange the words given below in a meaningful sequence.

1. Poverty
2. Population
3. Death
4. Unemployment
5. Disease

- (A) 2, 3, 4, 5, 1 (b) 3, 4, 2, 5, 1
(C) 2, 4, 1, 5, 3 (D) 1, 2, 3, 4, 5

15. One morning after sunrise Nivedita and Niharika were talking to each other face to face at Dalphin crossing. If Niharika's shadow was exactly to the right of Nivedita, Which direction Niharika was facing?
- (A) North (B) South
(C) East (D) Data is inadequate

16. What is the minimum number of different colours required to paint he given figure such that no two adjacent regions have the same colour?

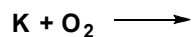


- (A) 3 (B) 4
(C) 5 (D) 6
17. Which state government launched the Bhavantar Bharpai Yojana?
- (A) Haryana (B) Bihar
(C) Punjab (D) Odisha
18. What is the name of the world's most powerful rocket tested by SpaceX recently?
- (A) New Shepard (B) Starship
(C) Falcon 9 (D) Atlas V
19. What is the name of India's first made-in-India surgical robot recently installed in Pune?
- (A) SSI Mantra (B) RoboSurg
(C) MediBot (D) Robotic Arm 3000
20. Jhumar is the folk dance of which state?
- (A) Madhya Pradesh (B) Haryana
(C) Bihar (D) Uttar Pradesh

PART-B

21. Dissolution of SbF_5 in BrF_3 produces
- (A) BrF_5 and SbF_3 (B) BrF and SbF_7
(C) $[\text{BrF}_2]^+ [\text{SbF}_6]^-$ (D) $[\text{SbF}_4]^+ [\text{BrF}_4]^-$
22. The type of carboxypeptidase metalloenzyme and the metal ion present in it, respectively, are
- (A) Hydrolase and Zn(II) (B) Isomerase and Zn(II)
(C) Hydrolase and Cu(II) (D) Isomerase and Cu(II)
23. The biomolecule that does NOT contain iron is
- (A) Cytochromes (B) Hemocyanin
(C) Hydrogenases (D) hemerythrin
24. Wilkinson's catalyst contains
- (A) ruthenium (I), square planar (B) ruthenium (I), tetrahedral
(C) rhodium (I), square planar (D) rhodium (I), tetrahedral
25. $[\text{Co}(\text{NH}_3)_5(\text{SO}_4)]\text{Br}$ and $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ are examples of
- (A) ionization isomers (B) linkage isomers
(C) optical isomers (D) co-ordination isomers
26. The shape of SCN^- is
- (A) linear (B) bent
(C) pyramidal (D) trigonal planar

27. The major product formed in the following reaction is



- (A) K_2O (B) K_2O_2
(C) KO_2 (D) K_2O_3

28. The order of increasing CO stretching frequencies in $[Co(CO)_4]^-$, $[Cu(CO)_4]^+$, $[Fe(CO)_4]^{2-}$, and $[Ni(CO)_4]$

- (A) $[Cu(CO)_4]^+ < [Ni(CO)_4] < [Co(CO)_4]^- < [Fe(CO)_4]^{2-}$
(B) $[Fe(CO)_4]^{2-} < [Co(CO)_4]^- < [Ni(CO)_4] < [Cu(CO)_4]^+$
(C) $[Co(CO)_4]^- < [Fe(CO)_4]^{2-} < [Cu(CO)_4]^+ < [Ni(CO)_4]$
(D) $[Ni(CO)_4] < [Cu(CO)_4]^+ < [Co(CO)_4]^- < [Fe(CO)_4]^{2-}$

29. The TRUE statement about $[Cu(H_2O)_6]^{2+}$ is

- (A) All Cu–O bond lengths are equal
(B) One Cu–O bond length is shorter than the remaining five
(C) Three Cu–O bond lengths are shorter than the remaining three
(D) Four Cu–O bond lengths are shorter than the remaining two

30. The correct order of bond angles in BF_3 , NH_3 , NF_3 and PH_3 is

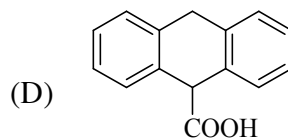
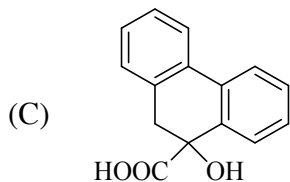
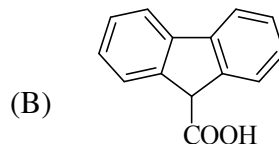
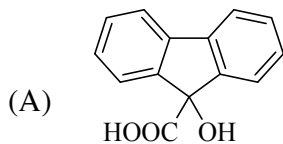
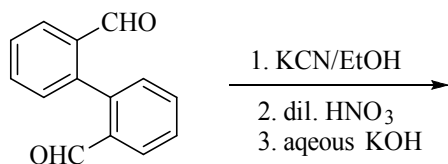
- (A) $BF_3 > NH_3 > NF_3 > PH_3$ (B) $PH_3 > BF_3 > NF_3 > NH_3$
(C) $BF_3 > PH_3 > NH_3 > NF_3$ (D) $NH_3 > NF_3 > BF_3 > PH_3$

31. The coordination number of Al in crystalline $AlCl_3$ and liquid $AlCl_3$, respectively is

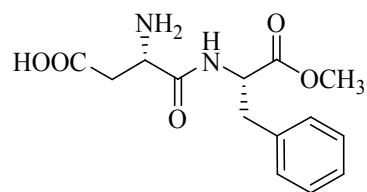
- (A) 4 and 4 (B) 6 and 6
(C) 6 and 4 (D) 3 and 6

32. The electrical conductivity of a metal
- (A) Increase with increasing temperature
 - (B) decrease with increasing temperature
 - (C) is independent of temperature
 - (D) shows oscillatory behaviour with temperature
33. Which of the following molecules have N–O–N bond present in it?
- (A) N_2O_4
 - (B) N_2O_5
 - (C) N_2O_3
 - (D) N_2O_2
34. The lanthanide ion the exhibits color in aqueous solution is
- (A) La (III)
 - (B) Eu (III)
 - (C) Gd (III)
 - (D) Lu (III)
35. The catalyst and co-catalyst used in Wacker process, respectively, are
- (A) PdCl_2 and Cu
 - (B) CuCl_2 and $[\text{PdCl}_4]^{2-}$
 - (C) Pd and CuCl
 - (D) $[\text{PdCl}_4]^{2-}$ and CuCl_2
36. The lewis acid character of BF_3 , BCl_3 and BBr_3 , follows the order
- (A) $\text{BF}_3 < \text{BBr}_3 < \text{BCl}_3$
 - (B) $\text{BCl}_3 < \text{BBr}_3 < \text{BF}_3$
 - (C) $\text{BF}_3 < \text{BCl}_3 < \text{BBr}_3$
 - (D) $\text{BBr}_3 < \text{BCl}_3 < \text{BF}_3$
37. When Al_4C_3 and Mg_2C_3 reacts with H_2O , then major products formed respectively, are
- (A) ethyne and ethane
 - (B) methane and propyne
 - (C) propane and propene
 - (D) methane and propene

38. The major product of the following reaction sequence is



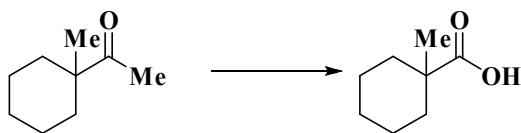
39. The following dipeptide derivative is used as an artificial sweetener



The constituent α -amino acids of this peptide are

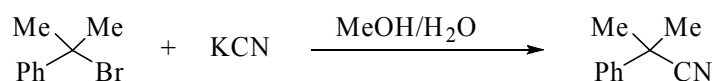
- (A) Phenylalanine and glutamic acid
- (B) Phenylalanine and aspartic acid
- (C) Tyrosine and aspartic acid
- (D) Tyrosine and glutamic acid

40. The suitable reagents combination for the following transformation



- (A) (i) *meta*-chloroperbenzoic acid; (ii) NaOH; (iii) aq. HCl
 (B) (i) OsO₄; (ii) aq. HCl
 (C) (i) I₂/NaOH; (ii) aq. HCl
 (D) (i) dimethyldioxirane (DMDO); (ii) aq. HCl

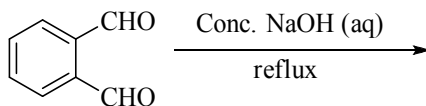
41. For the reaction



if the concentration of KCN is increased four times, then the rate of reaction would be

- (A) Unaffected
 (B) Increased by two times
 (C) decreased by four times
 (D) Increased by four times

42. The major product formed in the following reaction



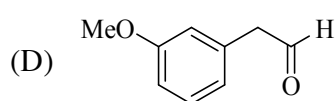
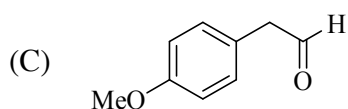
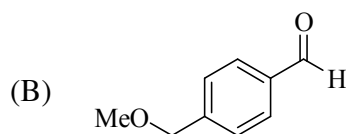
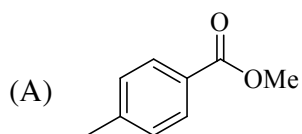
- (A)
- (B)
- (C)
- (D)

43. An organic compound having molecular formula $C_9H_{10}O_2$ exhibits the following spectral characteristics

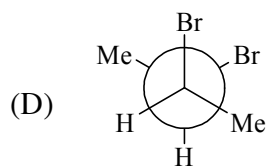
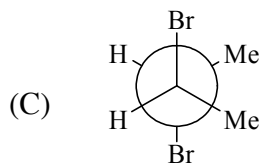
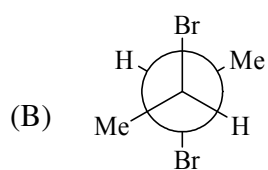
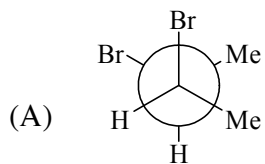
1H NMR: δ 9.72 (t, 1H), 7.1 (d, 2H), 6.7 (d, 2H), 3.8 (s, 3H), 3.6 (d, 2H)

IR: 1720 cm^{-1}

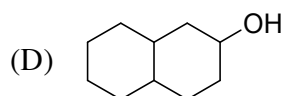
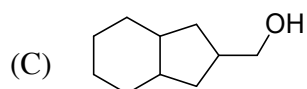
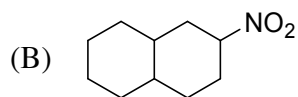
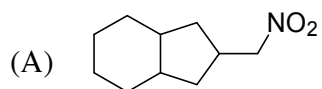
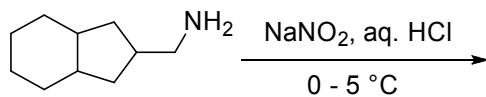
The most probable structure of the compound is



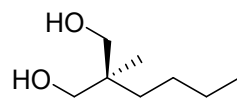
44. Among the following, the most stable conformation of meso-2,3-dibromobutane is



45. The major product formed in the reaction given below is



46. Predict the value for the specific rotation of the following compound.



(A) -13.5°

(B) 0°

(C) $+13.5^\circ$

(D) 27.0°

47. The number of normal modes of vibration in naphthalene are

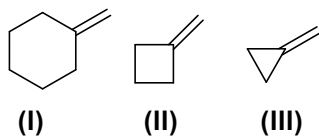
(A) 55

(B) 54

(C) 49

(D) 48

48. The correct order of IR stretching frequency of the C=C in the following olefins is



(A) I > II > III

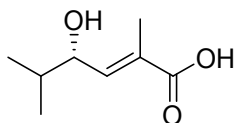
(B) II > III > I

(C) III > II > I

(D) III > I > II

49. A disaccharide that will not give Benedict's test and will not form osazone is
- (A) maltose (B) lactose
(C) cellobiose (D) sucrose
50. The sequence of an mRNA molecule produced from a DNA template strand with the composition 5'-AGCTACACT-3' is
- (A) 5'-AGUGUAGCU-3' (B) 5'-UCGAUGUGA-3'
(C) 5'-AGTGTAGCT-3' (D) 5'-TCGATGTGA-3'

51. The stereochemical notations for the compound are



- (A) 2Z, 4R (B) 2Z, 4S
(C) 2E, 4R (D) 2E, 4S
52. The decreasing order of isoelectric point for the following α -amino acids is
Lysine (I), Alanine (II), Glutamic acid (III)
- (A) I > II > III (B) II > I > III
(C) III > I > II (D) I > III > II
53. Among the given pH values, the O₂ binding efficiency of hemoglobin is maximum at
- (A) 6.8 (B) 7.0
(C) 7.2 (D) 7.4

54. A crystal has the lattice parameters $a \neq b \neq c; \alpha = \beta = \gamma = 90^\circ$
- (A) Tetragonal (B) Monoclinic
(C) Cubic (D) Orthorhombic
55. The change in entropy for a reversible adiabatic process is
- (A) Maximum (B) Zero
(C) Minimum (D) Positive
56. Among W (work), Q (heat), U (internal energy) and S (entropy)
- (A) W and U are path functions but Q and S are state functions.
(B) W and S are path functions but Q and U are state functions.
(C) S and U are path functions but Q and W are state functions.
(D) W and Q are path functions but U and S are state functions.
57. The de-Broglie wavelength for a He atom travelling at 1000 ms^{-1} (typical speed at room temperature) is
- (A) $99.7 \times 10^{-12} \text{ m}$ (B) $199.4 \times 10^{-12} \text{ m}$
(C) $199.4 \times 10^{-18} \text{ m}$ (D) $99 \times 10^{-6} \text{ m}$
58. 2.5 g of an iron compound upon suitable treatment yielded 0.391 g of iron (III) oxide. The percentage of iron in the compound is
- (A) 10.94 (B) 12.15
(C) 11.31 (D) 9.11
59. The entropy of mixing of 10 moles of helium and 10 moles of oxygen at constant temperature and pressure, assuming both to be ideal gas, is :
- (A) 115.3 JK^{-1} (B) 5.8 JK^{-1}
(C) 382.9 JK^{-1} (D) 230.6 JK^{-1}

60. Root mean square speed of the molecules of a perfect gas is proportional to
- (A) $\frac{1}{T^2}$ (B) T
- (C) $T^{\frac{1}{2}}$ (D) $\frac{1}{T}$
61. If the specific conductance of an electrolyte solution is $0.2 \Omega^{-1}\text{cm}^{-1}$ and cell constant is 0.25cm^{-1} , the conductance of the solution is
- (A) 1.25 (B) 1.0
- (C) 0.8 (D) 2.0
62. The temperature of 54 g of water is raised from 15°C to 75°C at constant pressure. The change in the enthalpy of the system (given that $C_{p,m}$ of water = $75 \text{JK}^{-1}\text{mol}^{-1}$) is :
- (A) 4.5 kJ (B) 13.5 kJ
- (C) 9.0 kJ (D) 18.0 kJ
63. The value of the rate constant for the gas phase reaction is $38 \text{dm}^3 \text{mol}^{-1} \text{s}^{-1}$ at 300 K. The order of the reaction is
- (A) 0 (B) 1
- (C) 2 (D) 3
64. For the given system



the number of components, phases and degree of freedom are

- (A) 1, 2 and 3 (B) 1, 3 and 0
- (C) 2, 2 and 1 (D) 2, 3 and 1

65. What is the ionic strength of the solution containing 0.05 M KNO_3 and 0.1 M Na_2SO_4 ?

(A) 0.15 M

(B) 0.25 M

(C) 0.30 M

(D) 0.35 M

66. The salt bridge in a galvanic cell allows the flow of

(A) ions but not electrons

(B) both ions and electrons

(C) electrons but not ions

(D) neither ions nor electrons

67. The maximum non-PV work that a system can perform at constant P is

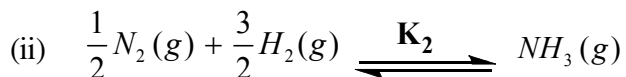
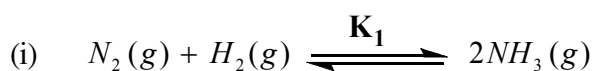
(A) ΔH

(B) ΔG

(C) ΔS

(D) ΔA

68. For the pair of reactions given below



If K_1 and K_2 are the equilibrium constant, then

(A) $K_1 = 2K_2$

(B) $K_1 = 2K_2^2$

(C) $K_1 = K_2^2$

(D) $K_1^2 = K_2$

69. Wavelength of X-ray used in the diffraction experiment is 1.54 \AA . X-rays are diffracted from a set of planes with an interplanar spacing of 1.54 \AA . Then the angle θ (in degrees) corresponding to the first order Bragg diffraction is
- (A) 30° (B) 15°
(C) 45° (D) 90°
70. For a diatomic molecule AB, the energy for the rotational transition from $J = 0$ to $J = 1$ state is 3.9 cm^{-1} . The energy for the rotational transition from $J = 3$ to $J = 4$ state would be
- (A) 3.9 cm^{-1} (B) 7.8 cm^{-1}
(C) 11.7 cm^{-1} (D) 15.6 cm^{-1}

ROUGH WORK

ROUGH WORK