

158/2025

Question Booklet
Alpha Code

A

Question Booklet
Serial Number

Total No. of questions : 100

Time : 1 Hour 30 Minutes

Maximum : 100 Marks

INSTRUCTIONS TO CANDIDATES

1. The question paper will be given in the form of a Question Booklet. There will be four versions of question booklets with question booklet alpha code viz. A, B, C & D.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the question booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a question booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your question booklet is un-numbered, please get it replaced by new question booklet with same alpha code.
6. The question booklet will be sealed at the middle of the right margin. Candidate should not open the question booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the question booklet supplied to him contains all the 100 questions in serial order. The question booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the question booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball-Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

158/2025

Maximum : 100 marks

Time : 1 hour and 30 minutes

1. The wavelength of second line of the Lyman series (Rydberg constant = 10^7 m^{-1}) is :

- | | |
|--------------|--------------|
| (A) 300 nm | (B) 510 nm |
| (C) 888.8 nm | (D) 112.5 nm |

2. Match the following List A (Molecule) with List B (Shape) :

List – A

List – B

- | | |
|--------------------------|-----------------|
| (a) NH_3 | (i) Tetrahedral |
| (b) H_2O | (ii) Pyramidal |
| (c) CH_4 | (iii) V shape |

- | | |
|----------------------------------|----------------------------------|
| (A) (a)-(i), (b)-(ii), (c)-(iii) | (B) (a)-(i), (b)-(iii), (c)-(ii) |
| (C) (a)-(ii), (b)-(iii), (c)-(i) | (D) (a)-(iii), (b)-(ii), (c)-(i) |

3. Which of the following statements is/are correct?

- (i) PbCl_2 is more stable than PbCl_4 due to inert pair effect
- (ii) Boron shows diagonal relationship with Magnesium
- (iii) PbCl_4 is more stable than PbCl_2 due to inert pair effect

- (A) Only (i)
- (B) Only (ii)
- (C) Only (iii)
- (D) Both (ii) and (iii)

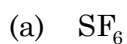
4. The element which has highest electron affinity is :

- | | |
|--------------|--------------|
| (A) Chlorine | (B) Fluorine |
| (C) Oxygen | (D) Nitrogen |

5. Match the following List A (Molecule) with List B (Hybridization) :

List – A

List – B



(i) sp



(ii) sp^3



(iii) sp^3d^2

(A) (a)-(ii), (b)-(iii), (c)-(i)

(B) (a)-(ii), (b)-(i), (c)-(iii)

(C) (a)-(iii), (b)-(i), (c)-(ii)

(D) (a)-(iii), (b)-(ii), (c)-(i)

6. Which of the following molecules has a bond order of 3?

(A) NO

(B) CO

(C) O_2

(D) F_2

7. Born-Haber cycle helps to determine :

(A) Bond order

(B) Entropy

(C) Specific heat capacity

(D) Lattice energy

8. Which of the following sets of quantum numbers is not permitted?

(A) $n = 4, l = 2, m = 0, s = +\frac{1}{2}$

(B) $n = 3, l = 2, m = -2, s = -\frac{1}{2}$

(C) $n = 4, l = -1, m = 0, s = +\frac{1}{2}$

(D) $n = 3, l = 0, m = 0, s = -\frac{1}{2}$

9. The wavelength (λ) associated with a microscopic particle of mass 2×10^{-19} kg and velocity 10^5 m/s is :

(A) 3.31×10^{-20} m

(B) 6.63×10^{-20} m

(C) 3.31×10^{-24} m

(D) 3.31×10^{-14} m

10. Which of the following statements is/are correct?

(i) Intermolecular hydrogen bonding is present in p-nitrophenol

(ii) Boiling point of p-nitrophenol is higher than o-nitrophenol

(iii) Intramolecular hydrogen bonding is present in p-nitrophenol

(A) Only (i)

(B) Only (ii)

(C) Only (iii)

(D) Both (i) and (ii)

11. Which among the following are not correct statements about Werner's co-ordination theory?
- In complexes, metal exhibit two types of valencies.
 - Primary valency corresponds to the co-ordination number and secondary valency corresponds to the oxidation state.
 - Every metal atom has fixed number of secondary valencies.
 - Primary valencies are satisfied by positive ions.
- (A) (i), (ii) (B) (ii), (iv)
(C) (ii), (iii) (D) (i), (iv)
12. Among the following co-ordination compounds, facial and meridional isomerism is exhibited by :
- (A) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ (B) $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]\text{Cl}$
(C) $[\text{Co}(\text{en})_3]\text{Cl}_3$ (D) $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$
13. For an octahedral high spin d^4 system, CFSE is equal to :
- (A) $-0.4 \Delta_0$ (B) $-0.8 \Delta_0$
(C) $-0.6 \Delta_0$ (D) $-1.6 \Delta_0$
14. The compound which exhibit Jahn-Teller distortion is :
- (A) $[\text{Mn}(\text{H}_2\text{O})_6]^{3+}$ (B) $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$
(C) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ (D) $[\text{Fe}(\text{CN})_6]^{4-}$
15. Which technique is used to determine the CFSE of transition metal complexes?
- (A) IR spectroscopy (B) UV - Visible Spectroscopy
(C) NMR - spectroscopy (D) MW spectroscopy
16. Which among the following contains bridged carbonyl group?
- (A) $\text{Fe}(\text{CO})_5$ (B) $\text{Fe}_2(\text{CO})_9$
(C) $\text{Co}_2(\text{CO})_8$ in solution (D) $\text{Cr}(\text{CO})_6$
17. Identify the first row transition metal (M) for $\text{HM}(\text{CO})_5$ species following 18 e rule:
- (A) Co (B) Cr
(C) Mn (D) Fe
18. The water splitting enzyme in photosynthesis is :
- (A) Mo_4O_4 Cluster (B) Mg_4O_4 Cluster
(C) Cr_4O_4 Cluster (D) Mn_4O_4 Cluster

19. Match the following :

Column – I	Column – II
(i) Hemoglobin	(a) Fe - storage
(ii) Transferrin	(b) <i>e</i> transfer agent
(iii) Ferritin	(c) Fe - transport
(iv) Ferredoxin	(d) Oxygen transport
(A) (i)-(d), (ii)-(a), (iii)-(c), (iv)-(b)	(B) (i)-(a), (ii)-(b), (iii)-(c), (iv)-(d)
(C) (i)-(d), (ii)-(c), (iii)-(b), (iv)-(a)	(D) (i)-(d), (ii)-(c), (iii)-(a), (iv)-(b)

20. The Fe-S protein present in nitrogenase is :

- | | |
|-----------------------------|-----------------------------|
| (A) Fe_2S_2 | (B) Fe_4S_4 |
| (C) Fe_3S_4 | (D) Fe_5S_4 |

21. Which of the following species does not exhibit hyperconjugation?

- | | |
|--|---|
| (A) $(\text{CH}_3)_2\text{CH} - \text{CH} = \text{CH}_2$ | (B) $\text{CH}_3 - \text{CH} = \text{CH}_2$ |
| (C) $\text{CH}_3 - \text{CH}_2^+$ | (D) $\text{CH}_2 = \text{CH}_2$ |

22. Select the correct order of increasing acid strength :

- (A) $\text{CH}_3\text{CH}_2\text{COOH} < \text{CH}_3\text{COOH} < \text{HCOOH} < \text{C}_6\text{H}_5\text{COOH}$
(B) $\text{CH}_3\text{CH}_2\text{COOH} < \text{CH}_3\text{COOH} < \text{C}_6\text{H}_5\text{COOH} < \text{HCOOH}$
(C) $\text{C}_6\text{H}_5\text{COOH} < \text{CH}_3\text{COOH} < \text{CH}_3\text{CH}_2\text{COOH} < \text{HCOOH}$
(D) $\text{HCOOH} < \text{CH}_3\text{COOH} < \text{CH}_3\text{CH}_2\text{COOH} < \text{C}_6\text{H}_5\text{COOH}$

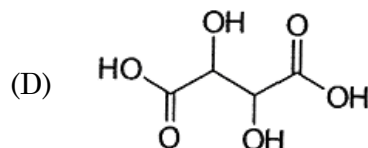
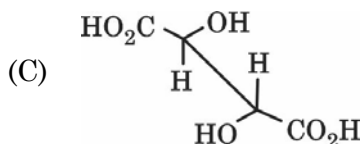
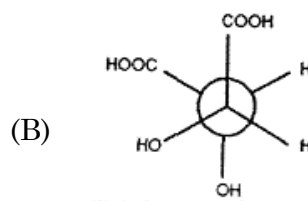
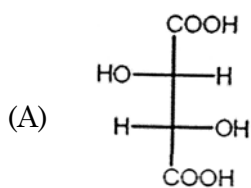
23. The shape of a singlet carbene is :

- | | |
|---------------------|-----------------|
| (A) Linear | (B) Bent |
| (C) Trigonal planar | (D) Tetrahedral |

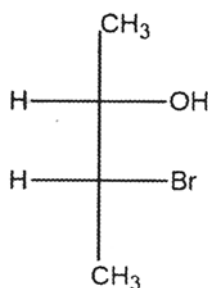
24. The major product formed by the addition of HBr to propene in the presence of peroxide is :

- | | |
|------------------------|--------------------|
| (A) 1-bromopropane | (B) 2-bromopropane |
| (C) 1,2-dibromopropane | (D) Allyl bromide |

25. Identify the Sawhorse projection formula of tartaric acid :



26. Select the correct R and S configuration of the compound :



(A) 2R, 3S

(B) 2R, 3R

(C) 2S, 3S

(D) 2S, 3R

27. Stereoisomers that contain chiral carbon atoms but are optically inactive are called :

(A) Enantiomers

(B) Diastereomers

(C) Meso compounds

(D) Epimers

28. Select the method that is not used for the separation of racemic mixtures :

(A) Mechanical separation

(B) Biochemical method

(C) Chemical method

(D) Distillation under reduced pressure

29. The E-Z system of nomenclature is used to identify :

(A) Optical isomers

(B) Geometrical isomers

(C) Conformational isomers

(D) Structural isomers

30. The configuration of the product formed by the unimolecular nucleophilic substitution reaction of an optically active alkyl halide is :

(A) Completely retained

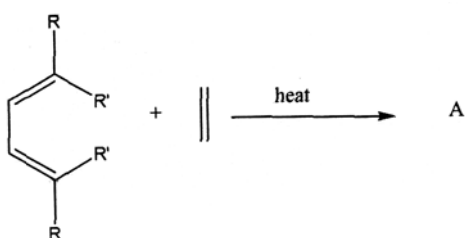
(B) Completely inverted

(C) A racemic mixture

(D) Same as that of the reactant

31. Phenanthrene belongs to _____ class of organic compound.
 (A) Anti-aromatic (B) Non-aromatic
 (C) Homoaromatic (D) Aromatic
32. Name the reaction and the product, when bromobenzene is treated with bromomethane in presence of Na :
 (A) Toluene and Wurtz - Fittig reaction
 (B) Biphenyl and Wurtz reaction
 (C) Ethane and Wurtz reaction
 (D) Methyl benzene and Wurtz reaction

33. Predict the product of given reaction :



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

34. Which among the following will give an acetylide ion on reaction with propyne?
 (A) NH_3 (B) NaOH
 (C) NaNH_2 (D) All the above
35. Reactivity order of halides for dehydrohalogenation reaction :
 (A) $\text{R-F} > \text{R-Cl} > \text{R-Br} > \text{R-I}$
 (B) $\text{R-I} > \text{R-Cl} > \text{R-Br} > \text{R-F}$
 (C) $\text{R-I} > \text{R-Br} > \text{R-Cl} > \text{R-F}$
 (D) $\text{R-F} > \text{R-I} > \text{R-Br} > \text{R-Cl}$

36. Zeisel's method is used to estimate
- (A) Halogens (B) Alcohols
(C) Ethers (D) Esters
37. Which among the following reagent give *ortho* and *para* substitution with chlorobenzene?
- (A) $\text{HNO}_3, \text{H}_2\text{SO}_4$ (B) Br_2/Fe
(C) $\text{AlCl}_3, \text{CH}_3\text{Cl}$ (D) All the above
38. $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Br} \xrightarrow{\text{KOH(alc)}} \text{A} \xrightarrow{\text{HBr}} \text{B} \xrightarrow{\text{KOH(aq)}} \text{C}$ predict the product C :
- (A) Propene (B) Propan-2-ol
(C) Propanol (D) All the above
39. Which of the following statement is incorrect about Jones's reagent?
- (A) The reagent is chromic acid and H_2SO_4 in acetone
(B) It oxidise primary alcohol to aldehyde
(C) It will not oxidise double bonds present in alcohols
(D) It will not oxidise secondary alcohols
40. What is the colour of sodium salt of indophenol in Libermann nitroso reaction?
- (A) Pink (B) Orange
(C) Green (D) Blue
41. Which of the following correctly describes the structure of cholesterol?
- (A) Cholesterol possesses a fused tetracyclic nucleus with three six-membered and one five-membered rings, a double bond between C7-C8 and a carbonyl group at C3.
(B) Cholesterol contains three six-membered and one five-membered rings, a double bond between C5-C6 and a β - hydroxyl group at C3.
(C) Cholesterol has four six-membered rings, a double bond between C5-C6 and a hydroxyl group at C17.
(D) Cholesterol possesses three six-membered and one five-membered rings, two double bonds (C5-C6 and C7-C8) and an α - hydroxyl group at C3.
42. According to the isoprene rule, the molecular formula of a sesquiterpene is :
- (A) $\text{C}_{10}\text{H}_{16}$ (B) $\text{C}_{15}\text{H}_{24}$
(C) $\text{C}_{20}\text{H}_{32}$ (D) $\text{C}_{25}\text{H}_{40}$

43. Which of the following alkaloids contains a phenanthrene ring?
- (A) Papaverine (B) Atropine
(C) Morphine (D) Quinine
44. Which toxic alkaloid, responsible for the death of the Greek Philosopher Socrates in 399 B.C., is obtained from the poisonous plant hemlock?
- (A) Morphine (B) Coniine
(C) Quinine (D) Nicotine
45. Which value is used to determine average molecular weight of fatty acids in fats?
- (A) Acid value (B) Iodine value
(C) Saponification value (D) Reichert-Meissl value
46. Which among the following is a monocyclic monoterpenoid?
- (A) Citral (B) Geraniol
(C) Menthol (D) Limonene
47. In lecithin, the phosphate group is typically attached to the glycerol backbone at :
- (A) C - 1 (B) C - 2
(C) C - 3 (D) C - 4
48. Identify the steroid hormone from the list :
- (A) Epinephrine (B) Cortisol
(C) Vasopressin (D) TSH
49. The cobalt atom present in the core structure is characteristic of which vitamin?
- (A) Vitamin B₆ (B) Vitamin B₁₂
(C) Vitamin B₃ (D) Vitamin C
50. Which vitamin is classified chemically as a terpenoid?
- (A) Vitamin A (B) Vitamin B₁
(C) Vitamin B₁₂ (D) Vitamin C
51. RMS velocity of N₂ at 300 K (M = 28 g/mol) is approximately :
- (A) 200 m/s (B) 300 m/s
(C) 517 m/s (D) 600 m/s

52. Mean free path is :
- (A) Distance between two molecules
 - (B) Average distance between successive collisions
 - (C) Proportional to molecular size
 - (D) Independent of pressure
53. Equal masses of CH_4 and O_2 are placed in a container at constant T. If the total pressure is 900 mm, what is the partial pressure of CH_4 ?
- (A) 600 mmHg
 - (B) 450 mmHg
 - (C) 300 mmHg
 - (D) 150 mmHg
54. Which of the following solutes will **increase** the surface tension of water when added at low concentration?
- (A) Sodium dodecyl sulfate (anionic surfactant)
 - (B) Ethanol (a small alcohol)
 - (C) Long-chain alcohol (surface-active)
 - (D) NaCl (Simple electrolyte)
55. For an ideal gas, the correct relationship between RMS speed (U_{rms}), average speed (U_{avg}) and most probable speed (U_{mp}) is :
- (A) $U_{\text{mp}} > U_{\text{rms}} > U_{\text{avg}}$
 - (B) $U_{\text{avg}} > U_{\text{mp}} > U_{\text{rms}}$
 - (C) $U_{\text{rms}} > U_{\text{avg}} > U_{\text{mp}}$
 - (D) $U_{\text{rms}} > U_{\text{mp}} > U_{\text{avg}}$
56. The **Kraft temperature** (Krafft point) of a detergent is :
- (A) The temperature at which the detergent becomes completely miscible in water and micelles start to form
 - (B) The temperature at which the detergent decomposes into fatty acids and glycerol.
 - (C) The temperature at which surface tension of water becomes zero.
 - (D) The temperature at which micelles break down into individual ions and precipitation occurs.
57. An X-ray diffraction experiment uses $\text{CuK}\alpha$ radiation with wavelength $\lambda = 1.00 \text{ \AA}$. A second-order Bragg diffraction ($n = 2$) is observed at an angle $2\theta = 60^\circ$. What is the interplanar spacing d (in $\text{\AA}$)?
- (A) $2.00 \text{ \AA}$
 - (B) $1.00 \text{ \AA}$
 - (C) $0.50 \text{ \AA}$
 - (D) $1.50 \text{ \AA}$

58. Match Column A with Column B :

Column A		Column B	
(i)	Body Centred Cubic (BCC)	(P)	Coordination number = 12
(ii)	Face Centred Cubic (FCC)	(Q)	Coordination number = 8
(iii)	NaCl crystal structure	(R)	FCC arrangement of Cl^- ions
(iv)	Bravais Lattices	(S)	Total 14 possible arrangements
(v)	CsCl structure	(T)	BCC arrangement of Cl^- ions
(A)	(i)-(Q), (ii)-(P), (iii)-(T), (iv)-(S), (v)-(R)		
(B)	(i)-(Q), (ii)-(P), (iii)-(R), (iv)-(S), (v)-(T)		
(C)	(i)-(P), (ii)-(Q), (iii)-(R), (iv)-(S), (v)-(T)		
(D)	(i)-(P), (ii)-(Q), (iii)-(T), (iv)-(S), (v)-(R)		

59. Identify the incorrect statement :

- (A) Crystalline solids have definite melting point
- (B) Amorphous solids are isotropic
- (C) Crystalline solids are anisotropic
- (D) Glass is an anisotropic solid

60. A solid has the following lattice parameters :

$$a = b = c ; \alpha = \beta = \gamma \neq 90^\circ$$

which type of crystal system does it belong to?

- (A) Rhombohedral (Trigonal)
- (B) Orthorhombic
- (C) Tetragonal
- (D) Hexagonal

61. The dispersed phase and dispersion medium in smoke are respectively :

- (A) Liquid and gas
- (B) Gas and liquid
- (C) Solid and gas
- (D) Gas and solid

62. A small quantity of FeCl_3 is added to a freshly prepared $\text{Fe}(\text{OH})_3$ precipitate. The process is called :

- (A) Double decomposition
- (B) Peptisation
- (C) Condensation
- (D) Coagulation

63. When 1 ml 10% NaCl is added to 10 ml gold sol in the presence of 0.025 g of starch, the coagulation is just prevented. The gold number of starch will be :

- (A) 25
- (B) 2.5
- (C) 0.25
- (D) 10

64. Which of the following is not true about physisorption?
- It is reversible
 - Forces involved are weak
 - It is favoured by high temperature and low pressure
 - It is favoured by low temperature and high pressure
65. For Freundlich adsorption isotherm, when $\log x/m$ is plotted against $\log P$, the slope will be :
- n
 - 1/n
 - $\log 1/n$
 - $\log K$
66. The rate constant for a first order reaction is 0.01s^{-1} . What will be the half-life of the reaction in seconds?
- 69.3
 - 100
 - 10
 - 6.93
67. For a first order reaction, a plot of rate versus concentration of reactant will be :
- Curve with negative slope
 - Curve with positive slope
 - Straight line with negative slope
 - Straight line with positive slope
68. The rate constant of a reaction with activation energy zero will be :
- Zero
 - Independent of temperature
 - Decreases with temperature
 - Increases with temperature
69. For the reaction $\text{CO}_2(\text{g}) + \text{H}_2(\text{g}) \rightleftharpoons \text{CO}(\text{g}) + \text{H}_2\text{O}(\text{g})$, increase of pressure will:
- Have no effect on equilibrium constant
 - Decrease the equilibrium constant
 - Favour forward reaction
 - Favour backward reaction
70. A change in which of the following factors will shift the position of equilibrium in a reaction?
- Temperature
 - Concentration
 - Pressure
 - All the above
71. Which of the following is a **systematic error**?
- Instrumental zero error
 - Random fluctuation in readings
 - Error due to parallax while reading scale
 - Human estimation in end-point detection

72. Match the following types of errors with their suitable examples:

Type of error	Example
(a) Gross error	(1) Reading meniscus from different angles
(b) Systematic error	(2) Constant drift in balance reading
(c) Random error	(3) Spillage of titrant during titration
(d) Personal error	(4) Wrongly recording data value
(e) Instrumental error	(5) Wrong calibration of burette

(A) (a)-(3), (b)-(1), (c)-(4), (d)-(2), (e)-(5)

(B) (a)-(4), (b)-(5), (c)-(3), (d)-(2), (e)-(1)

(C) (a)-(5), (b)-(3), (c)-(1), (d)-(4), (e)-(2)

(D) (a)-(3), (b)-(5), (c)-(1), (d)-(4), (e)-(2)

73. Which of the following statements is **incorrect** about significant figures?

- (A) All non-zero digits are significant
- (B) Zeros between non-zero digits are significant
- (C) Leading zeros before decimal point are significant
- (D) Trailing zeros after decimal point are significant

74. Which combination of terms correctly describes the **distribution of random errors**?

- | | |
|------------------------|----------------------------|
| (A) Skewed, asymmetric | (B) Bell-shaped, symmetric |
| (C) Flat, uniform | (D) Stepwise, irregular |

75. Which of the following radicals is **not** eliminated by treatment with concentrated nitric acid?

- | | |
|--------------|---------------|
| (A) Oxalate | (B) Phosphate |
| (C) Arsenite | (D) Chromate |

76. In the preparation of sodium-carbonate extract, boiling the mixture helps to :

- (A) Decompose organic matter only
- (B) Convert insoluble salts to soluble carbonates and release acid radicals
- (C) Remove cations from the mixture
- (D) Form insoluble hydroxides

77. Match **Column I** with **Column II** correctly and select the right option :

Column I	Column II
(i) Nucleation	(a) Formation of tiny particles (embryos) of a new phase
(ii) Co-precipitation	(b) Impurities carried down with the main precipitate
(iii) Post-precipitation	(c) Formation of a secondary precipitate after the main one
(iv) Digestion	(d) Standing or heating to improve purity and crystal size
(v) Peptization	(e) Re-dispersion of coagulated precipitate into colloidal form
(vi) Ignition	(f) Conversion of precipitate into stable, weighable form
(A) (i)-(a), (ii)-(b), (iii)-(c), (iv)-(d), (v)-(e), (vi)-(f)	
(B) (i)-(a), (ii)-(c), (iii)-(b), (iv)-(d), (v)-(e), (vi)-(f)	
(C) (i)-(a), (ii)-(b), (iii)-(c), (iv)-(f), (v)-(e), (vi)-(d)	
(D) (i)-(a), (ii)-(c), (iii)-(b), (iv)-(f), (v)-(e), (vi)-(d)	

78. Identify the INCORRECT statement regarding redox indicators :

- (A) They change colour due to oxidation or reduction of the indicator itself.
- (B) Diphenylamine is used in the titration of Fe^{2+} with $\text{K}_2\text{Cr}_2\text{O}_7$.
- (C) The potential at the equivalence point depends on the indicator's redox potential
- (D) Redox indicators are used in acid-base titrations

79. In an acidic medium, the equivalent weight of potassium dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$) in a redox titration is :

- | | |
|----------------------------|----------------------------|
| (A) 49 g eq^{-1} | (B) 98 g eq^{-1} |
| (C) 294 g eq^{-1} | (D) 147 g eq^{-1} |

80. Which statement is **correct** regarding **linear regression** in analytical calibration?

- (A) The slope corresponds to instrument intercept
- (B) The correlation coefficient is always 0
- (C) The regression equation expresses concentration as a function of response
- (D) The regression equation has no practical use

81. Select the *correct* statements from the following :

- (i) Wave number of MW radiation is higher than IR radiation
- (ii) Wave length of UV radiation is less than IR radiation
- (iii) Wave number of MW radiation is less than visible radiation
- (iv) Wave length of UV radiation is higher than visible radiation

- (A) Only (i) and (iv) (B) Only (iii) and (iv)
(C) Only (ii) and (iii) (D) Only (i) and (ii)

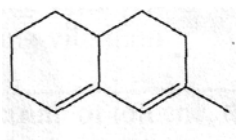
82. Which of the following electronic transition requires highest energy?

- (A) $n \rightarrow \pi^*$ transition (B) $\sigma \rightarrow \sigma^*$ transition
(C) $n \rightarrow \sigma^*$ transition (D) $\pi \rightarrow \pi^*$ transition

83. In UV-Visible spectroscopy, the term *hypochromic effect* refers to :

- (A) Shift to longer wavelength
(B) Increase in absorption intensity
(C) Shift to shorter wavelength
(D) Decrease in absorption intensity

84. Based on Woodward-Fieser rules, the $\lambda_{\max}$ corresponds to the following diene is :

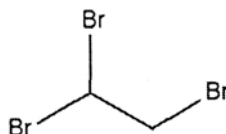


- (A) 240 nm (B) 278 nm
(C) 235 nm (D) 273 nm

85. Which of the following cycloalkanone exhibit highest C = O stretching frequency?

- (A) Cyclobutanone (B) Cyclopropanone
(C) Cyclohexanone (D) Cyclopentanone

86. In the high-resolution ^1H NMR spectrum of the following molecule, the signal corresponds to methylene protons appears as :



- (A) Singlet (B) Doublet
(C) Triplet (D) Quartet

87. An organic compound with molecular formula C_5H_{12} gives only one signal in its 1H NMR spectrum. The compound will be :
- (A) Isopentane (B) Cyclopentane
(C) n-pentane (D) Neopentane
88. In the IR spectrum of alcohols, the broad band in the region $3200-3600\text{ cm}^{-1}$ corresponds to :
- (A) C–H bending vibration (B) O–H bending vibration
(C) O–H stretching vibration (D) C–O stretching vibration
89. In the 1H NMR spectrum of toluene, the methyl proton signal appears as a singlet nearly at :
- (A) $\delta = 2.3\text{ ppm}$ (B) $\delta = 1.0\text{ ppm}$
(C) $\delta = 4.1\text{ ppm}$ (D) $\delta = 7.1\text{ ppm}$
90. Select the *correct* statement related to 1H NMR spectrum of ethyl acetate :
- (A) Three signals (all are singlets)
(B) Three signals (singlet, doublet and quartet)
(C) Three signals (singlet, triplet and quartet)
(D) Two signals (singlet and quartet)
91. Which of the following statement is not correct for conductometric titration?
- (A) As the end point in these titrations is the intersection of two lines, no extra care is needed near the end point.
(B) These titrations can be used for coloured solutions
(C) These titrations cannot be used for very dilute solutions
(D) These titrations can be used for the titrations of mixture of weak and strong acids
92. In potentiometry which of the following is used to predict the variation in potential during a redox titration :
- (A) Ohm's law (B) Boyles law
(C) Stokes equation (D) Nernst equation
93. In atomic absorption spectroscopy which of the following is used as radiation source?
- (A) Hollow cathode lamp (B) Prism
(C) Grating (D) Photo multiplier tube

94. Qualitative analysis can be done using flame emission spectroscopy by plotting :
- (A) Velocity as function of wavelength
 - (B) Emitted intensity as function of wavelength
 - (C) Pressure as a function of wavelength
 - (D) Pressure as function of emitted intensity
95. Which of the following statement is not correct?
- (A) In TG mass of sample is monitored as function of temperature
 - (B) DSC is not used to determine the purity of drugs
 - (C) DSC can be used to measure activation energy and rate constant for a particular transition
 - (D) DTA does not require a change in mass of the sample in order to obtain meaningful information
96. The basic principle behind colorimetry :
- (A) Beer-Lambert's law
 - (B) Boyle's law
 - (C) Hook's law
 - (D) Avagadro's law
97. The resolving power of TEM is derived from :
- (A) Spherical aberration
 - (B) Specimen
 - (C) Electrons
 - (D) X rays
98. Which of the following is correct for Atomic Force Microscopy (AFM)?
- (A) AFM do not have high resolution
 - (B) AFM require special treatments that would change or damage the sample
 - (C) AFM do not provide a three dimensional surface profile
 - (D) AFM commonly operated in two modes
99. What does the R_f value in chromatography represent?
- (A) The ratio of solvent weight to the solute weight
 - (B) The ratio of solute weight to solvent weight
 - (C) Distance travelled by solute divided by distance travelled by solvent front
 - (D) Distance travelled by solvent front divided by distance travelled by solute
100. In mass spectrometry, McLafferty rearrangement refers to :
- (A) Cleavage of beta bond followed by gamma hydrogen transfer
 - (B) Cleavage of alpha bond followed by beta hydrogen transfer
 - (C) Cleavage of beta bond followed by beta hydrogen transfer
 - (D) Cleavage of alpha bond followed by alpha hydrogen transfer

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